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SPECIAL FEATURES

- LE 2 - Jetronic 25-pin control unit, 5-pin air-flow sensor, 7-pin control relay. Solenoid-operated injection valves with brass wire coil and O-ring.
- Cold-start control, i.e. extra fuel injected through all injection valves.
- No start valve or thermo-time switch.

Note:

The LE 2 - Jetronic in the Citroen Visa GTI is basically the same as that in the Peugeot 505 GTI.

- Similar SIS repair instructions:
SIS microcard PEU-502 of 5.84

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER

- Universal test adapter 0 684 101 801 and
- Adapter lead 1 684 463 123

The following rapid diagnosis chart makes it possible for the experienced L-Jetronic expert to quickly check the electrical part of the system using the universal test adapter.

The rapid diagnosis chart contains the following information:

- Sequence of test steps
- Settings of V and Ω program switches
- Notes on how to operate the universal test adapter or other components.
- Test specifications for motortester and multimeter



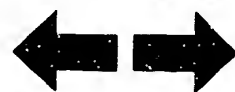
Rapid diagnosis chart for universal test adapter

Test step	Switch setting		Measurement	Remarks	Test specifications (reading)
	V	Ω			
1	5	-	Voltage pulses from ignition coil terminal 1. On control unit plug between terminals 1 and 5.	Shift to neutral, start.	Ignition pulses on oscilloscope
2	6	-	Voltage from control relay term. 87b. On control unit plug between terminals 9 and 5.	Shift to neutral, start.	8 ... 15 V
3	7	-	Voltage from starting motor term. 50. On control unit plug between terminals 4 and 5.	Shift to neutral, start.	8 ... 15 V
4	↓	11	Resistance combination in air-flow sensor term. 8. On control-unit plug between terminals 8 and 5.	---	100 ... 200 Ω
5	↓	12	Resistance of potentiometer in air-flow sensor term. 7. On control unit plug between terminals 7 and 5.	Deflect air-flow sensor flap as far as it will go.	60 ... 1000 Ω
6	↓	13	Resistance of temperature sensor NTC II term. 10 (engine temperature). On control unit plug between terminals 10 and 5.	+15° ... +30° C: +80° C:	1.45 ... 3.3 k Ω 280 ... 390 Ω
7	↓	14	Resistance of output stage ground term. 13. On control unit plug between terminals 13 and 5.	----	0 ... 10 Ω
8	↓	16	Resistance of idle contact in throttle-valve switch term. 2. On control unit plug between terminals 2 and 9.	Accelerator in rest position: Accelerator slightly depressed:	0 ... 10 Ω ∞ Ω
9	↓	17	Resistance of full-load contact in throttle-valve switch term. 3. On control unit plug between terminals 3 and 9.	Accelerator in full-load position: Accelerator in rest position:	0 ... 10 Ω ∞ Ω
10	↓	18	Resistance of all 4 parallel-connected solenoid-operated injection valves term. 12. On control unit plug between terminals 12 and 9.	---	+20° C: 7.0 ... 9.5 Ω +80° C: 7.2 ... 10.0 Ω

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Rapid diagnosis chart

Citroen Visa GTI



A4

Rapid diagnosis chart

Citroen Visa GTI



In addition, check the following leads for continuity
(Set value 0 Ω):

(These leads are not covered with the universal test adapter during the rapid diagnosis).

- From control unit plug terminal 9 to auxiliary-air device plug 48.
- From control unit plug terminal 13 to auxiliary-air device plug M24.
- From control relay term. 87b to electric fuel pump. Positive terminal.
- From ground terminal of electric fuel pump to vehicle ground.



TEST SPECIFICATIONS

Pressure regulator

- Fuel pressure: 2.8 ... 3.2 bar

Electric fuel pump

- Fuel delivery (measured in return): min. 650 cm³/30 s
- Terminal voltage under load: min. 12 V

Auxiliary-air device

- Electrical internal resistance 40 ... 75 Ω

Temperature sensor NTC II (engine)

- Electrical internal resistance
at ambient temperature
(+15° C ... +30° C): 1.45 ... 3.3 k Ω
with engine at op. temp.
(approx. +80° C): 280 ... 360 Ω

Air-flow sensor

- Resistance between:
term. 8 and term. 5: 340 ... 450 Ω
term. 7 and term. 5: 60 ... 1000 Ω 1)
term. 9 and term. 5: 500 ... 750 Ω
term. 8 and term. 9: 160 ... 300 Ω

1) (Air-flow sensor flap fully deflected)

Cold-start control with NTC II plug disconnected

- Terminal voltage at one injection valve:

Drops from initially greater than approx 2.5V to
approx 0.3 V within approx 15 s cranking time.



Test specifications (continued)

Solenoid-operated injection valve

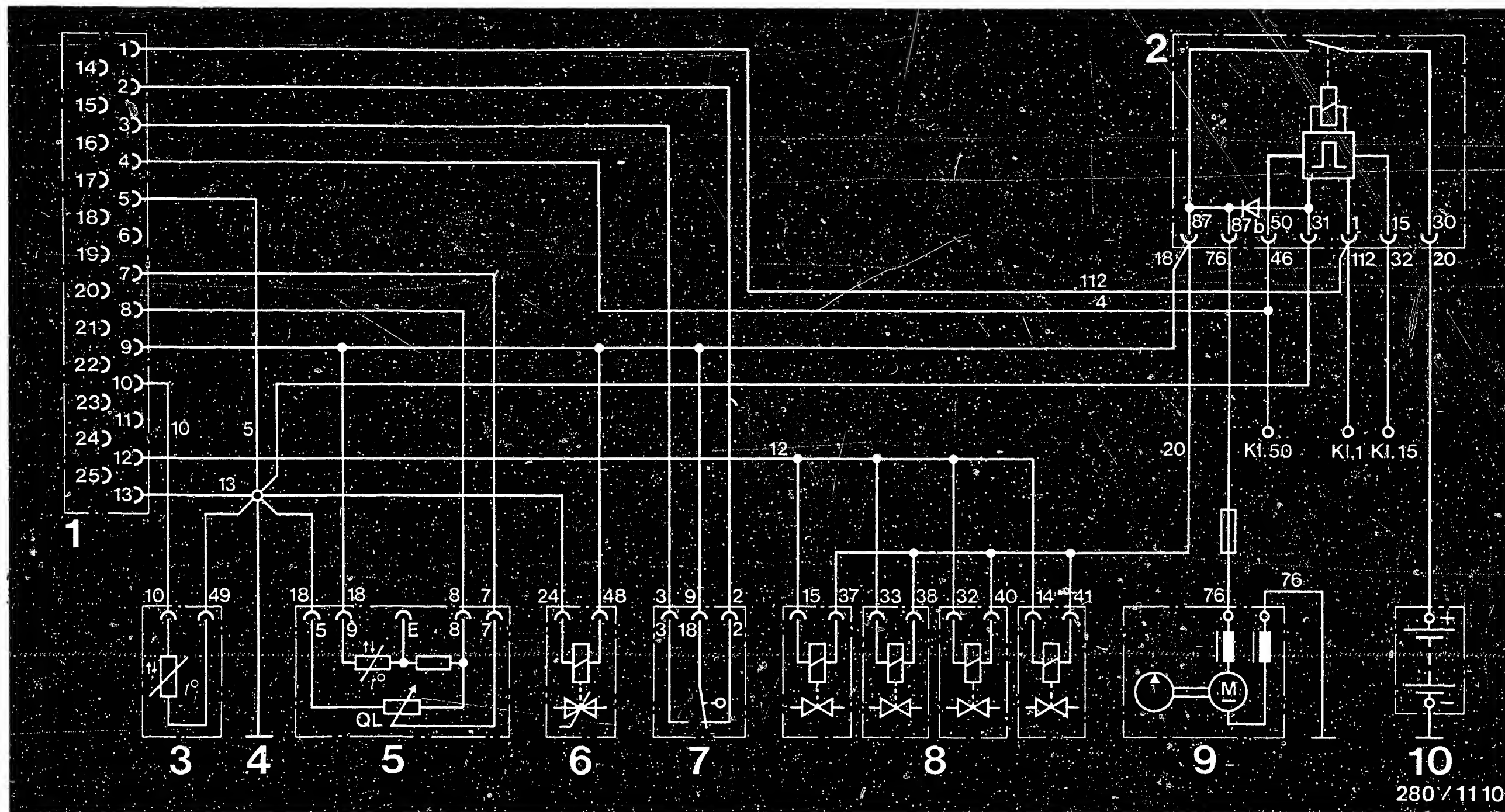
- Electrical internal resistance at +20° C: 15.0 ... 17.5 Ω

Idle adjustment with engine at normal operating temperature, approx. +80° C

- Idle speed:
 - Europe version 850 ... 900 min⁻¹
- CO concentration: 1.0 ... 2.0 vol. %

See equipment and Autodata microfiches for settings for ignition, valve clearance and other engine data.





ELECTRICAL TERMINAL DIAGRAM

- 1 = Control-unit plug
2 = Control relay
3 = Temperature sensor II
(Engine temperature)

- 4 = Central ground for output stage
and electronics
5 = Air-flow sensor
6 = Auxiliary-air device

- 7 = Throttle-valve switch
8 = Injection valve
9 = Electric fuel pump
10 = Battery



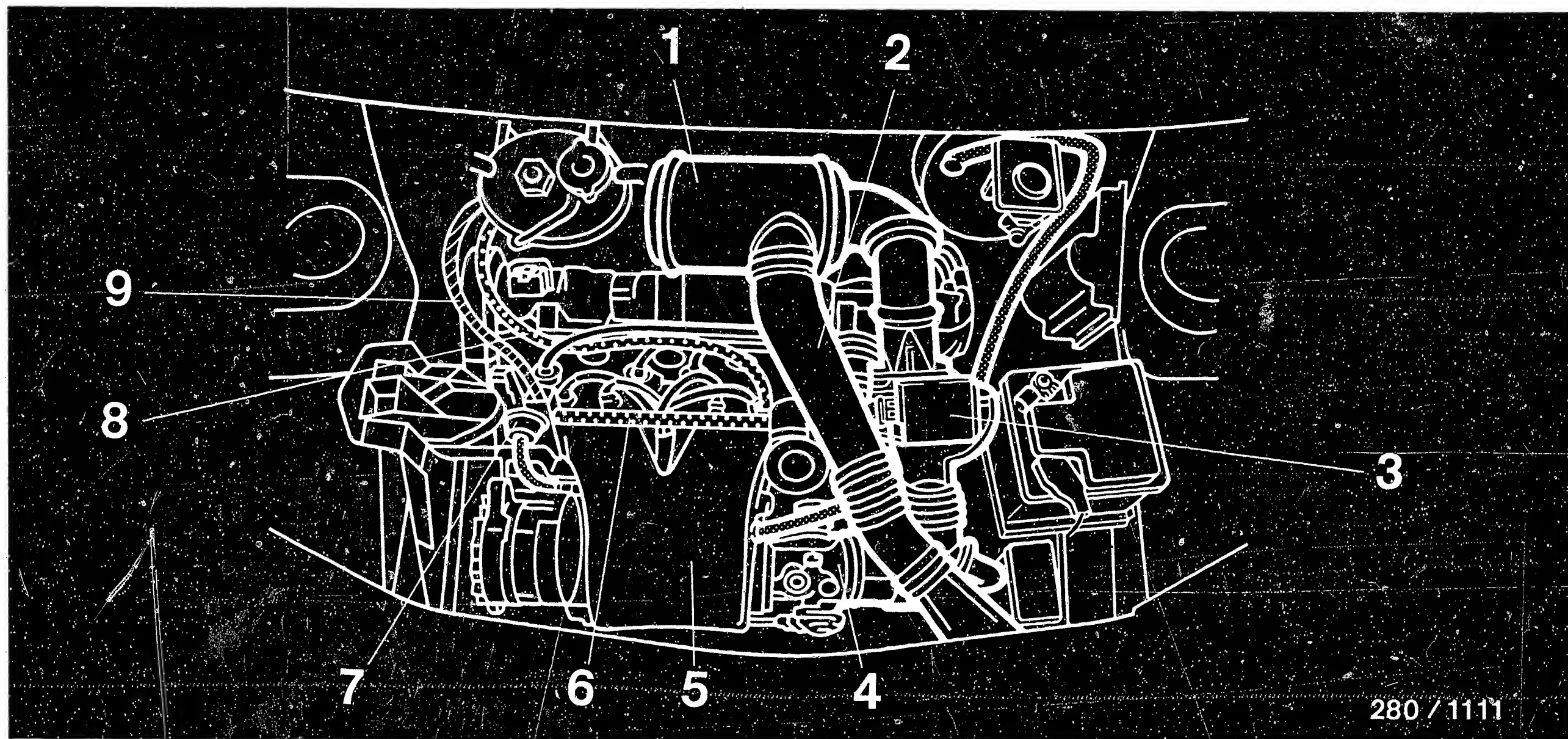


DIAGRAM OF AIR AND FUEL LINES

● Air lines

— = Atmospheric pressure

▤ = Intake-manifold pressure

● Fuel lines

▥ = Fuel pressure

▧ = Pressureless

1 = Air filter

2 = Air-guide hose

3 = Air-flow sensor

4 = Throttle-valve assembly

5 = Intake manifold

6 = Fuel distribution pipe

7 = Pressure regulator

8 = Fuel delivery line
(Inlet)

9 = Fuel return line

A10

Diagram of air and fuel lines

Citroen-Visa GTI

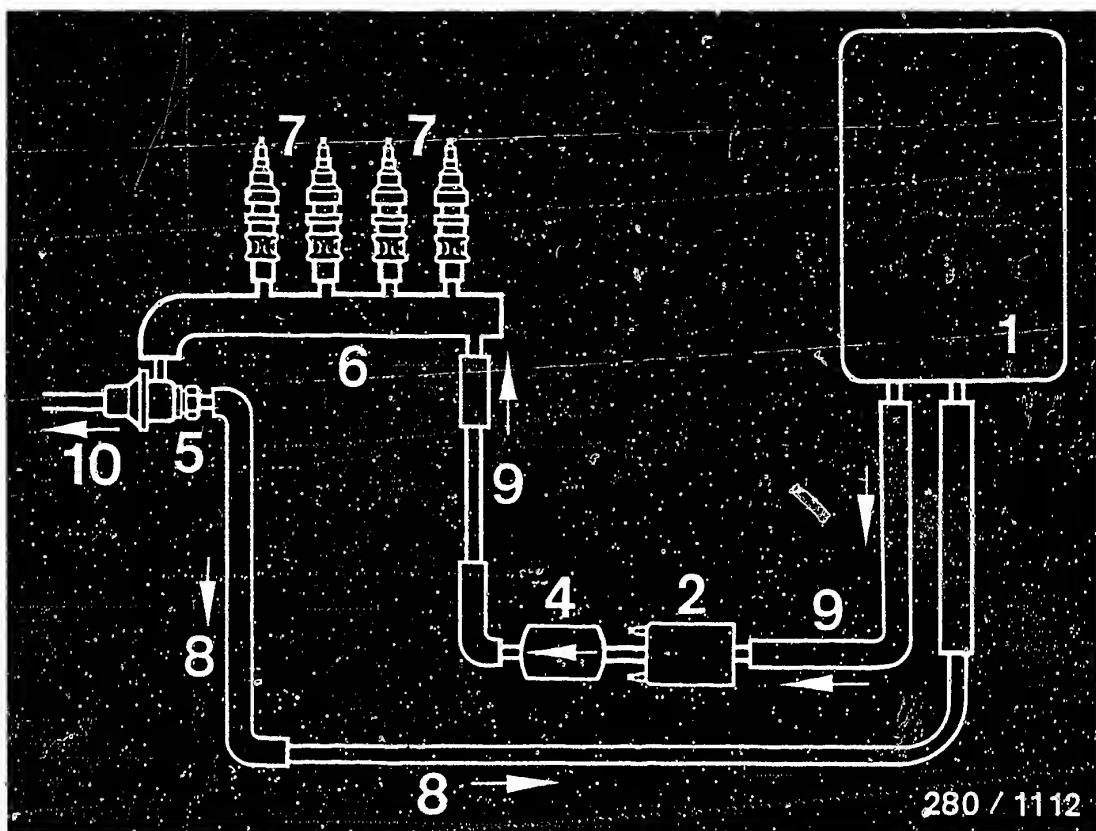


A11

Diagram of air and fuel lines

Citroen-Visa GTI



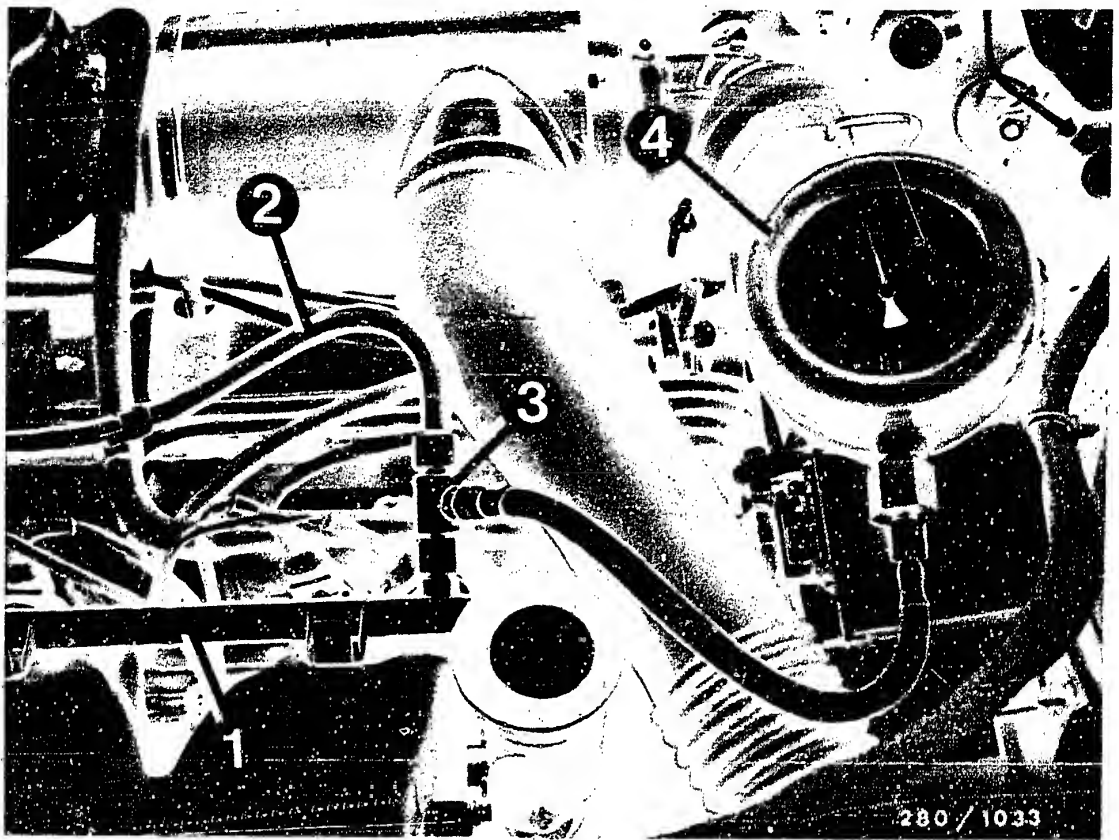


280 / 1112

DIAGRAM OF FUEL LINES

- 1 = Fuel tank
- 2 = Electric fuel pump
- 4 = Fuel filter
- 5 = Pressure regulator
- 6 = Fuel-distribution pipe
- 7 = Solenoid-operated injection valves
- 8 = Fuel return line
- 9 = Fuel delivery line
- 10 = To intake manifold





similar to Visa GTI

- 1 = Fuel-distribution pipe
- 2 = Delivery line, inlet
- 3 = Connecting part KDJE-P100/14
- 4 = Pressure gauge of pressure tester KDJE-P 100

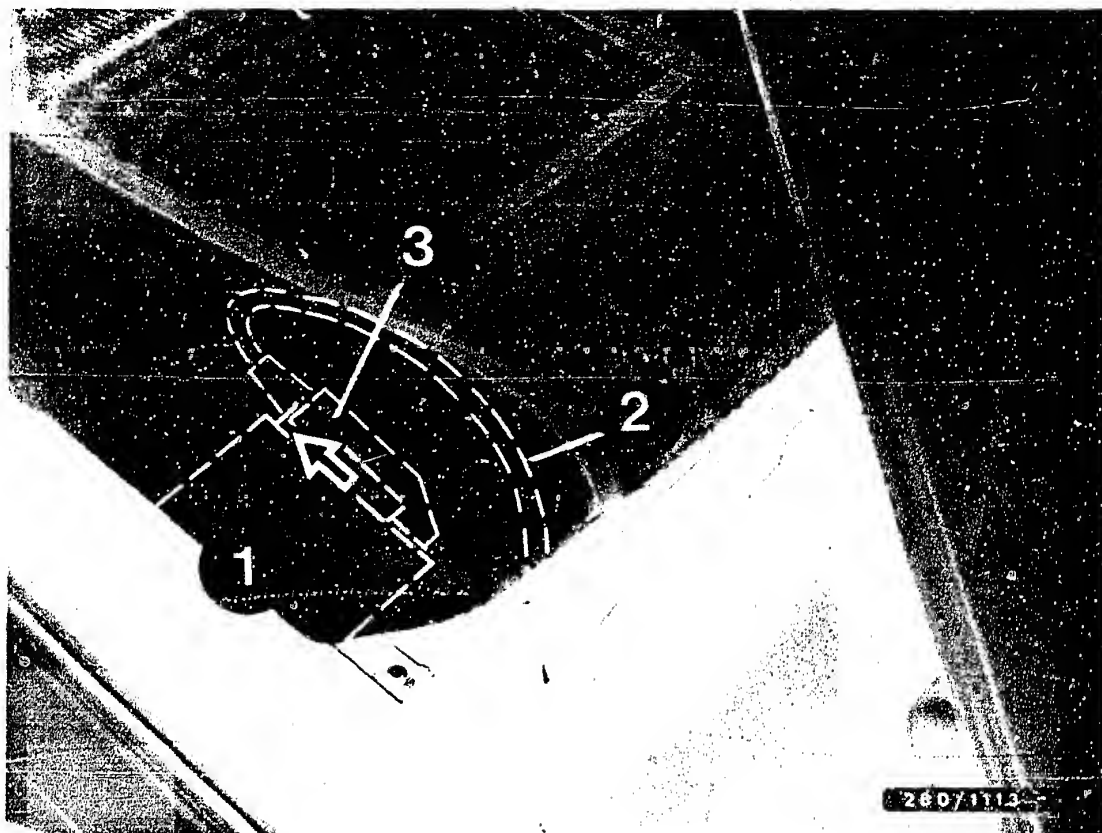
FUEL PRESSURE TEST

Use pressure gauge and hose line of pressure tester KDJE-P 100 for the pressure test.

Connect connecting part KDJE-P100/14 in between at the fuel-distribution pipe inlet and connect hose line with pressure gauge at the lateral threaded fitting.

Caution: When opening the screw connection, make sure that no fuel gets onto hot parts of the engine.





- 1 = LE 2 control unit
- 2 = Vehicle wiring harness
- 3 = Control-unit plug

Installation position of components

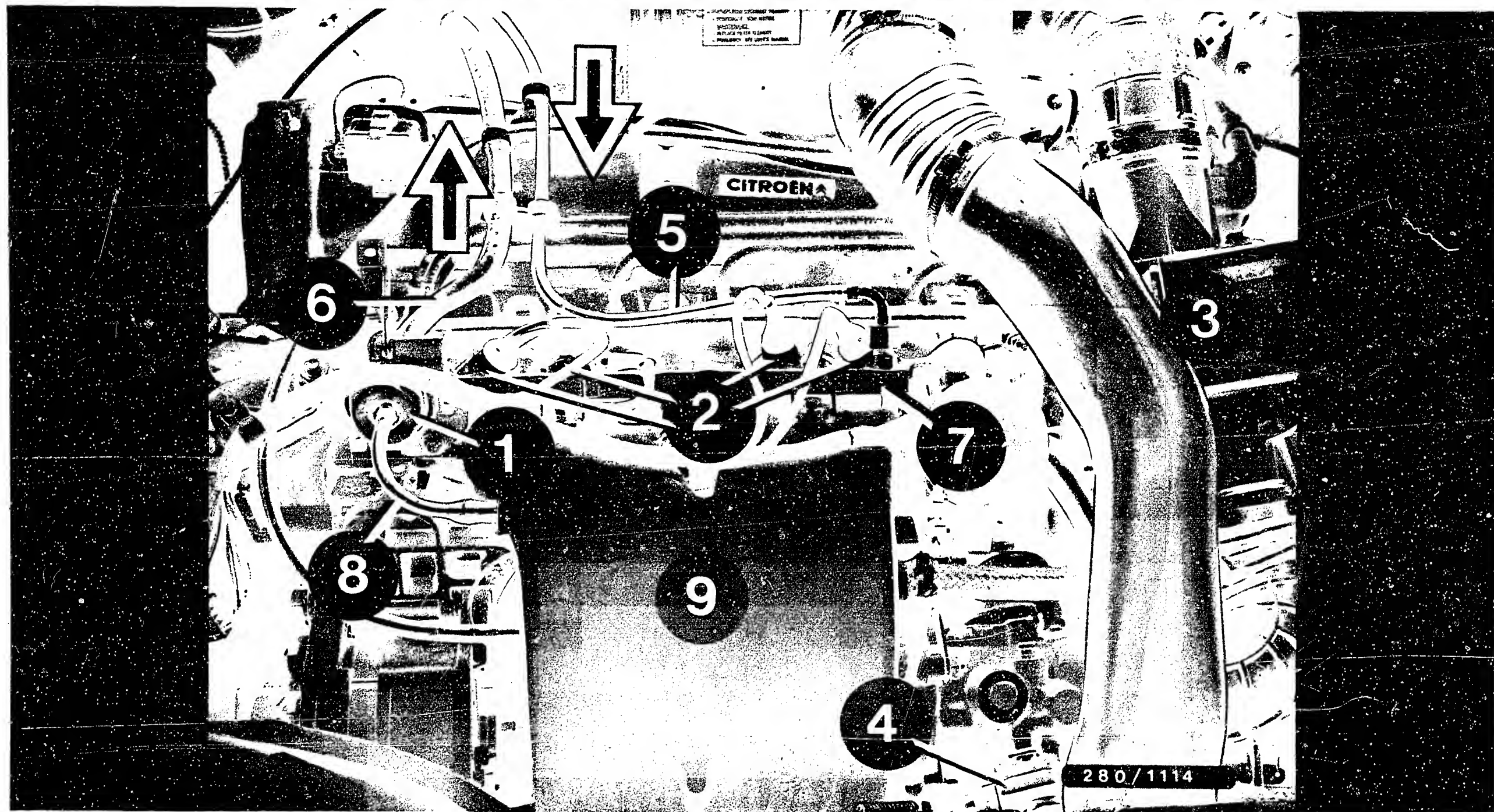
The indications "right" and "left" apply always as viewed in the forward direction of travel.

To connect the universal test adapter, disconnect control-unit plug (25-pin). To do this, press detent in direction of arrow.

Control unit:

The control unit is in the passenger compartment under the front-passenger seat on the right.





Installation position of components (continued)

- 1 = Pressure regulator
- 2 = Injection valves
with O-ring seal
- 3 = Air-flow sensor

- 4 = Throttle-valve switch
- 5 = Fuel delivery line
- 6 = Fuel return line
- 7 = Fuel-distribution pipe

- 8 = Vacuum hose to
intake manifold
 - 9 = Intake manifold
- Arrows: Direction of fuel flow

A15

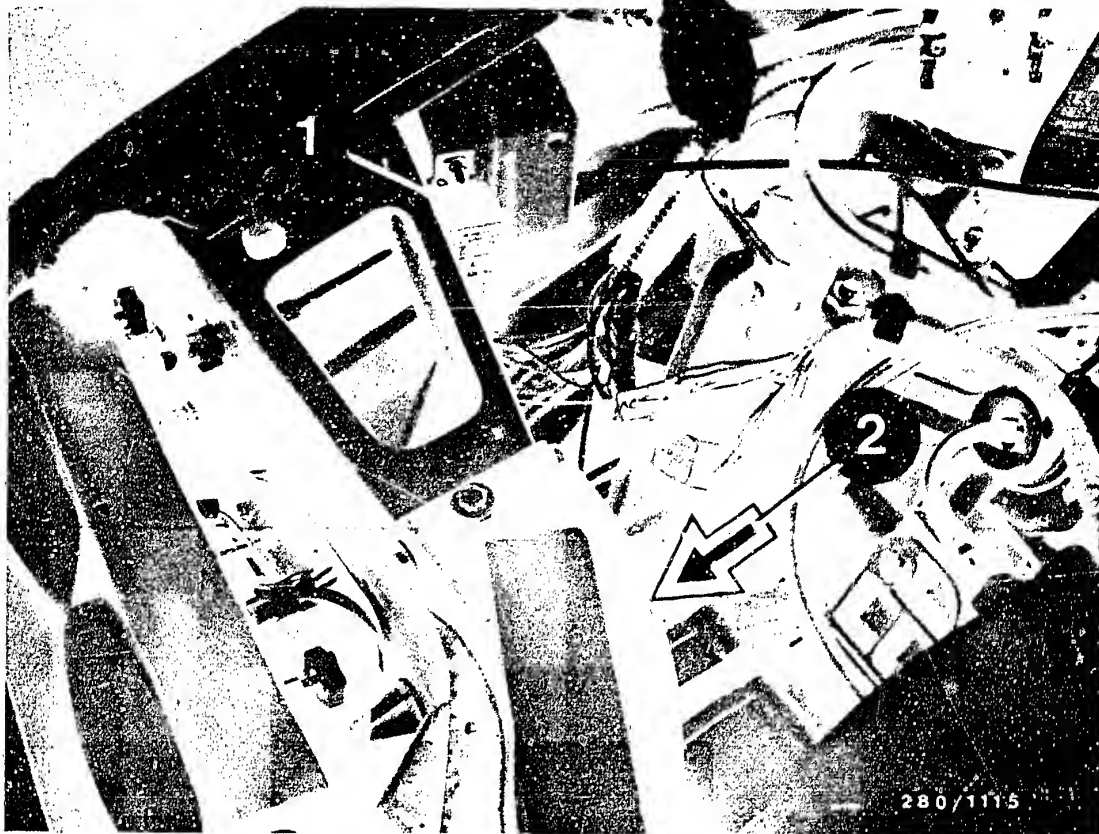
Installation position of components
Citroen-Visa GTI



A16

Installation position of components
Citroen-Visa GTI





- 1 = Control relay
2 = Central ground

Installation position of components (continued)



- Auxiliary-air device

Under ignition distributor, on left on engine block.

- Temperature sensor

Next to auxiliary-air device, on left on engine block.

- Central ground terminal

4 Front right, to left of left-hand headlamp

- Electric fuel pump and fuel filter

Under vehicle in front of right-hand rear wheel.



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Installation position of components	B 15



Special features

- For Fiat Uno Turbo 1.3 l EU version (4.85 →)
- LE 2 - Jetronic with 25-pin control unit
0 280 000 336, energized from term. 1 of the ignition coil. 5-pin air-flow sensor and 7-pin control relay. Solenoid-operated injection valves with brass-wire coil.
- Cold-start control, i.e. extra fuel injected through all injection valves.
- No start valve or thermo-time switch.
- Electric fuel pump with prefilter and fuel-line-pressure damper.
- Auxiliary blower to cool the injection valves.
- Thermo-time switch for auxiliary blower, +97°C cut-in temperature, +94° cut-out temperature.
- Exhaust-gas turbocharger, max. charge-air pressure 0.55 bar gauge pressure.
- Charge-air cooler.

Note:

Similar SIS repair instructions:

SIS microcard OPE-502.

Important note: If reference is made to a basic micro-card, remember that the test specifications must always be taken from the vehicle-related brief instructions.

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER

- Universal test adapter 0 684 101 801 and
- Adapter lead 1 684 463 123

The following rapid diagnosis chart makes it possible for the experienced L-Jetronic expert to quickly check the electrical part of the system using the universal test adapter.

The rapid diagnosis chart contains the following information:

- Sequence of test steps
- Settings of V and Ω program switches
- Notes on how to operate the universal test adapter or other components.
- Test specifications for motortester and multimeter



Rapid diagnosis chart for universal test adapter

Testing of LE 2-Jetronic with adapter lead 1 684 463 123

<u>Test step</u>	<u>Switch position</u>		<u>Measurement</u>	<u>Control-unit plug between terminals</u>	<u>Remarks</u>	<u>Test specifications (Reading)</u>
	V	Ω				
1	5	-	Voltage pulses from ignition coil term. 1	1 and 5	Shift gear to neutral, start	Ignition pulses on oscilloscope
2	6	-	Voltage from control relay term.87	9 and 5	Shift gear to neutral, start	8 ... 15 V
3	7	-	Voltage from ignition and starting switch term. 50	4 and 5	Shift gear to neutral, start	8 ... 15 V
4	↓	11	Resistance combination in air-flow sensor term. 8	8 and 5	---	100 ... 200 Ω
5	↓	12	Resistance of potentiometer in air-flow sensor term. 7	7 and 5	Deflect sensor flap as far as it will go	60 ... 1000 Ω
6	↓	13	Resistance of temperature sensor NTC II, term. 10 (engine temperature)	10 and 5	---	+15°C...+30°C: 1.45...3.3 k Ω +80°C : 280 ... 360 Ω

B3

Rapid diagnosis chart

Fiat



B4





Rapid diagnosis chart

Fiat



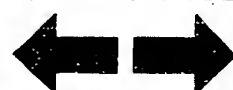
Rapid diagnosis chart for universal test adapter (continued)

Testing of LE 2-Jetronic with adapter lead 1 684 463 123

<u>Test step</u>	<u>Switch position</u>		<u>Measurement</u>	<u>Control-unit plug between terminals</u>	<u>Remarks</u>	<u>Test specifications (Reading)</u>
	V	Ω				
7		14	Resistance of output stage ground term. 13	13 and 5	---	0 ... 10 Ω
8		16	Resistance of idle contact in throttle-valve switch term. 2	2 and 9	Accelerator in rest position	0 ... 10 Ω
					Accelerator slightly depressed	∞ Ω
9		17	Resistance of full-load contact in throttle-valve switch term. 3.	3 and 9	Accelerator in rest position	∞ Ω
					Accelerator in full-load position	0 ... 10 Ω
10		18	Resistance of all 4 parallel-connected solenoid-operated injection valves term. 12	12 and 9	---	+15°C...+30°C: 6.8 ... 9.3 Ω approx. +80°C: 7.0 ... 9.8 Ω

B5

Rapid diagnosis chart
Fiat



B6

Rapid diagnosis chart
Fiat



TEST SPECIFICATIONS

Pressure regulator

- Fuel pressure: 2.8 ... 3.2 bar

Electric fuel pump

- Fuel delivery at return: min. 650 cm³/30 s
- Terminal voltage under load: min. 12 V

Auxiliary-air device

- Electrical internal resistance 40 ... 75 Ω

Temperature sensor NTC II (engine)

- Electrical internal resistance
at ambient temperature
(+15° C ... +30° C): 1.45 ... 3.3 k Ω
with engine at op. temp.
(approx. +80° C): 280 ... 360 Ω

Air-flow sensor

- Resistance between:
term. 8 and term. 5: 340 ... 450 Ω
term. 7 and term. 5: 60 ... 1000 Ω 1)
term. 9 and term. 5: 500 ... 760 Ω
term. 8 and term. 9: 160 ... 300 Ω

1) (Air-flow sensor flap fully deflected)

Cold-start control with NTC II plug disconnected

- Terminal voltage at one injection valve:

Drops within approx. 15 s cranking time from
initially greater than 2.5 V to approx. 0.3 V.



Test specifications (continued)

Solenoid-operated injection valve

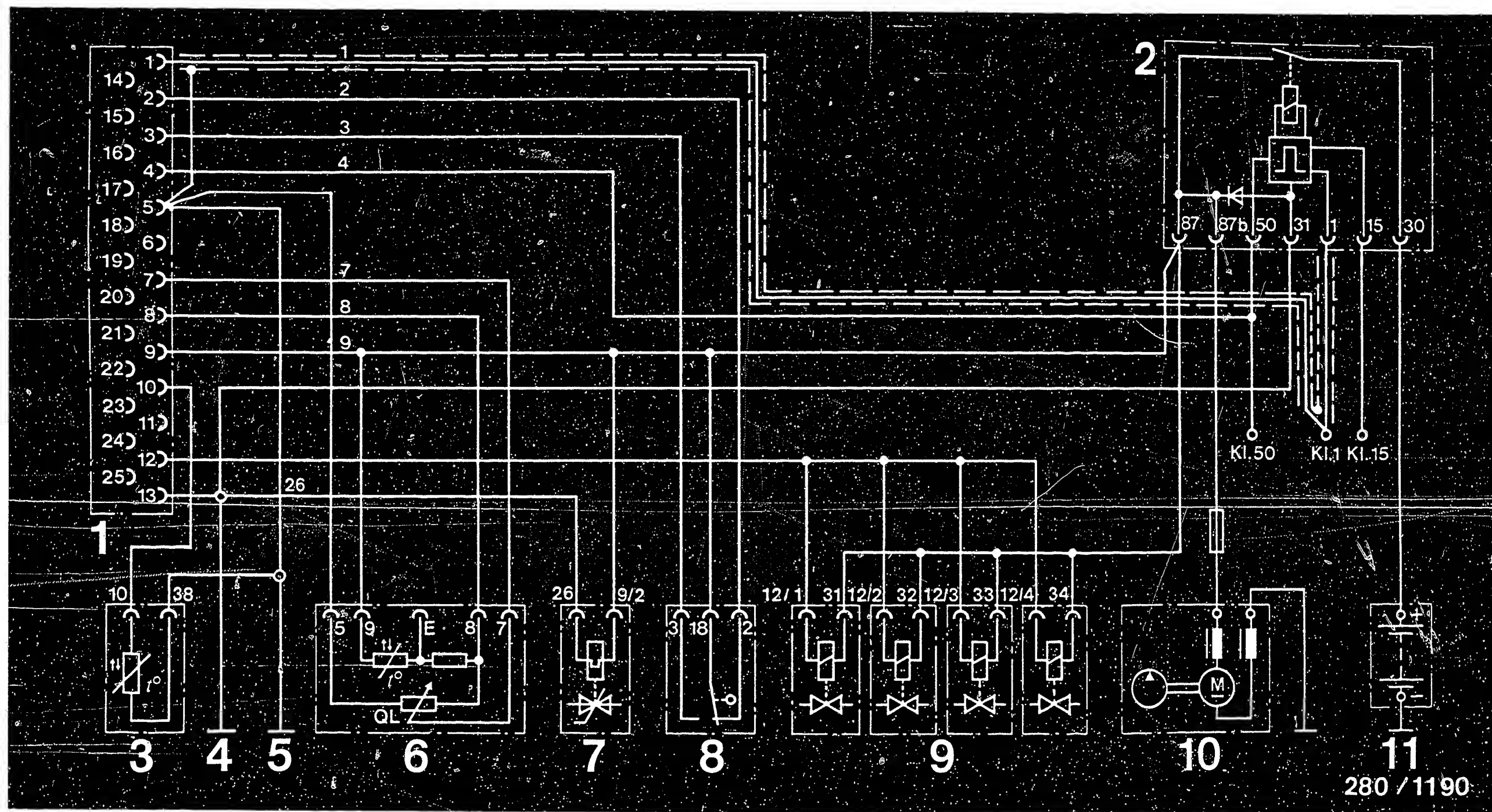
- Electrical internal resistance at +15°C...+30°C 14,5 ... 17,0 Ω

Idle adjustment with engine at normal operating temperature, approx. +80° C

- Idle speed:
Europe version 950 ... 1000 min⁻¹
- CO concentration: 0,5 ... 1,5 vol. %

See equipment and Autodata microfiches for settings for ignition, valve clearance and other engine data.





ELECTRICAL TERMINAL DIAGRAM

1 = Control-unit plug
 2 = Control relay
 3 = Temperature sensor II
 (engine temperature)

4 = Output stage ground connection
 5 = Electronics ground connection
 6 = Air-flow sensor
 7 = Auxiliary-air device

8 = Throttle-valve switch
 9 = Injection valves
 10 = Electric fuel pump
 11 = Battery

B9

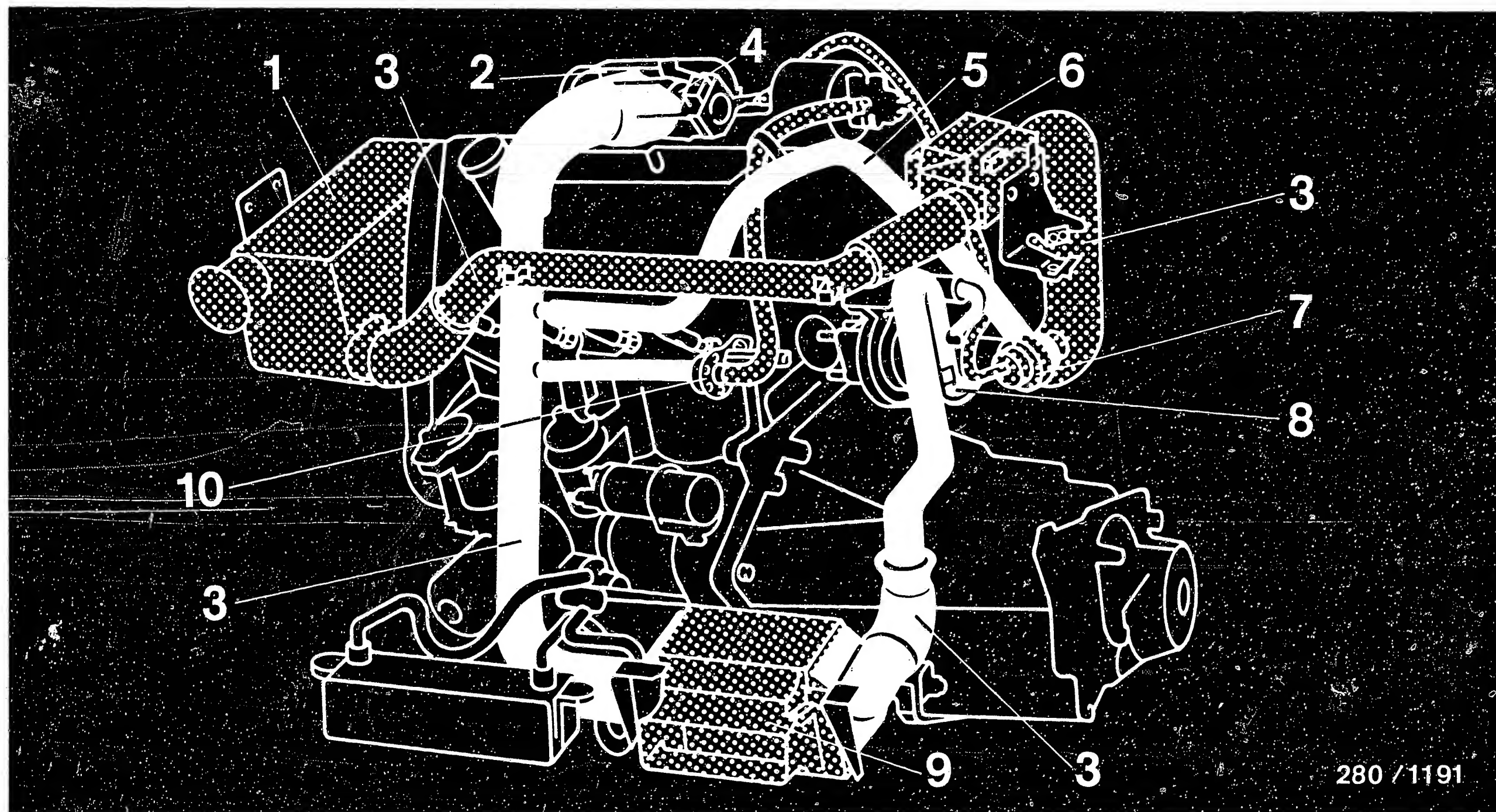
Electrical terminal diagram
 Fiat



B10

Electrical terminal diagram
 Fiat





280 /1191

Diagram of air lines

Atmospheric pressure
Charge-air pressure

1 = Air filter
2 = Intake manifold
3 = Air-guide pipe
4 = Throttle-valve assembly

5 = Bypass hose
6 = Air-flow sensor
7 = Bypass valve
8 = Turbocharger

9 = Charge-air cooler
10 = Auxiliary-air device

B11

Diagram of air lines
Fiat



B12

Diagram of air lines
Fiat



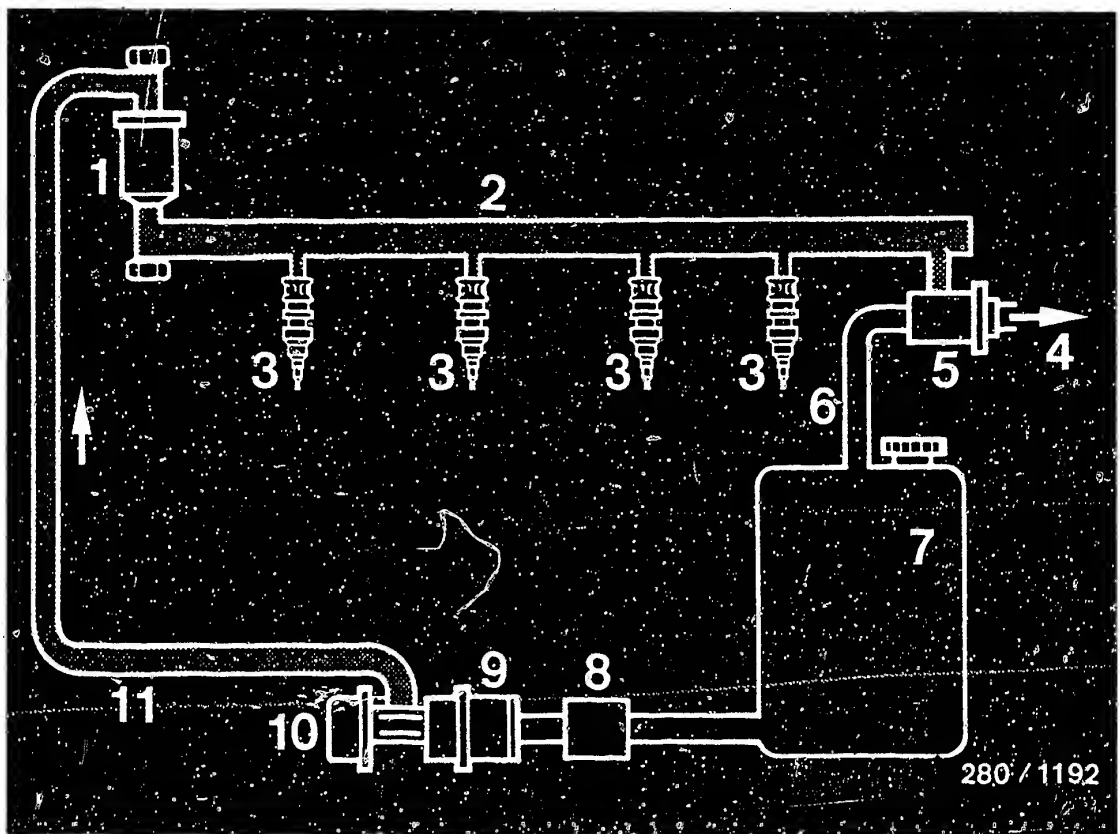


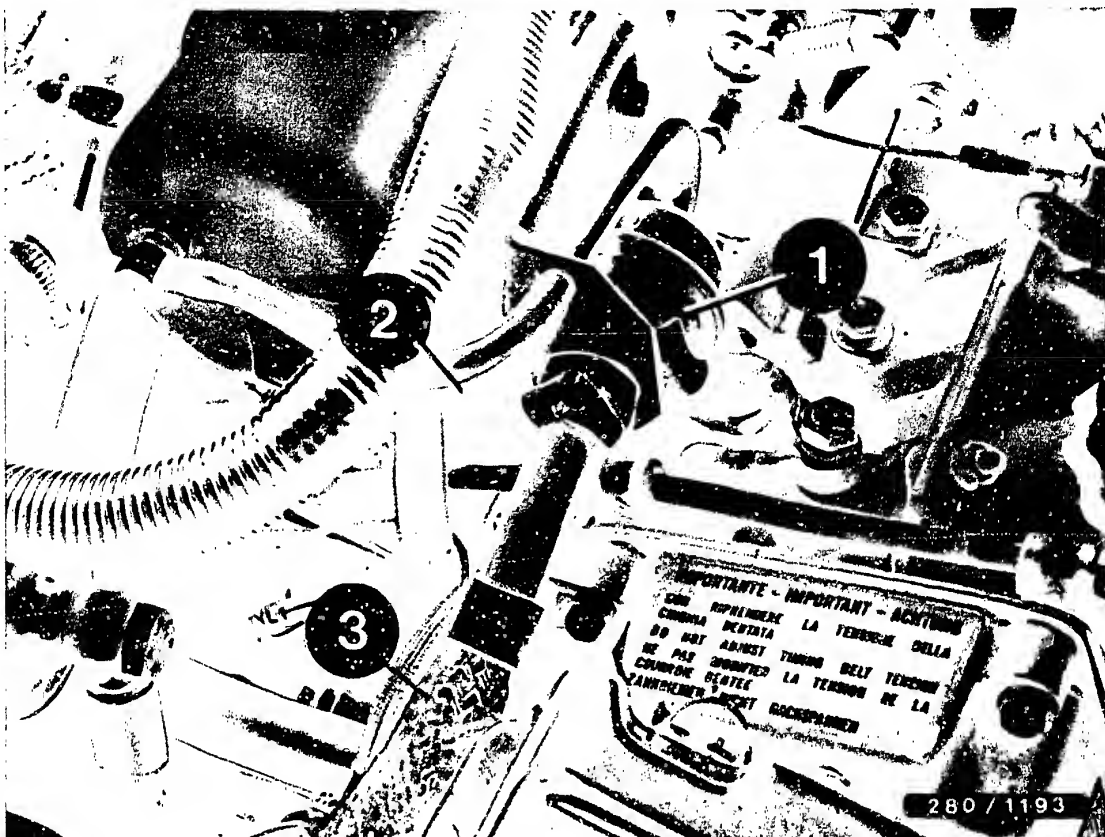
DIAGRAM OF FUEL LINES

===== pressureless

..... Fuel pressure

- 1 = Fuel filter
- 2 = Fuel-distribution pipe
- 3 = Solenoid-operated injection valve
- 4 = Intake-manifold pressure connection
- 5 = Pressure regulator
- 6 = Return line
- 7 = Fuel tank
- 8 = Prefilter
- 9 = Electric fuel pump
- 10 = Fuel-line-pressure damper
- 11 = Delivery line





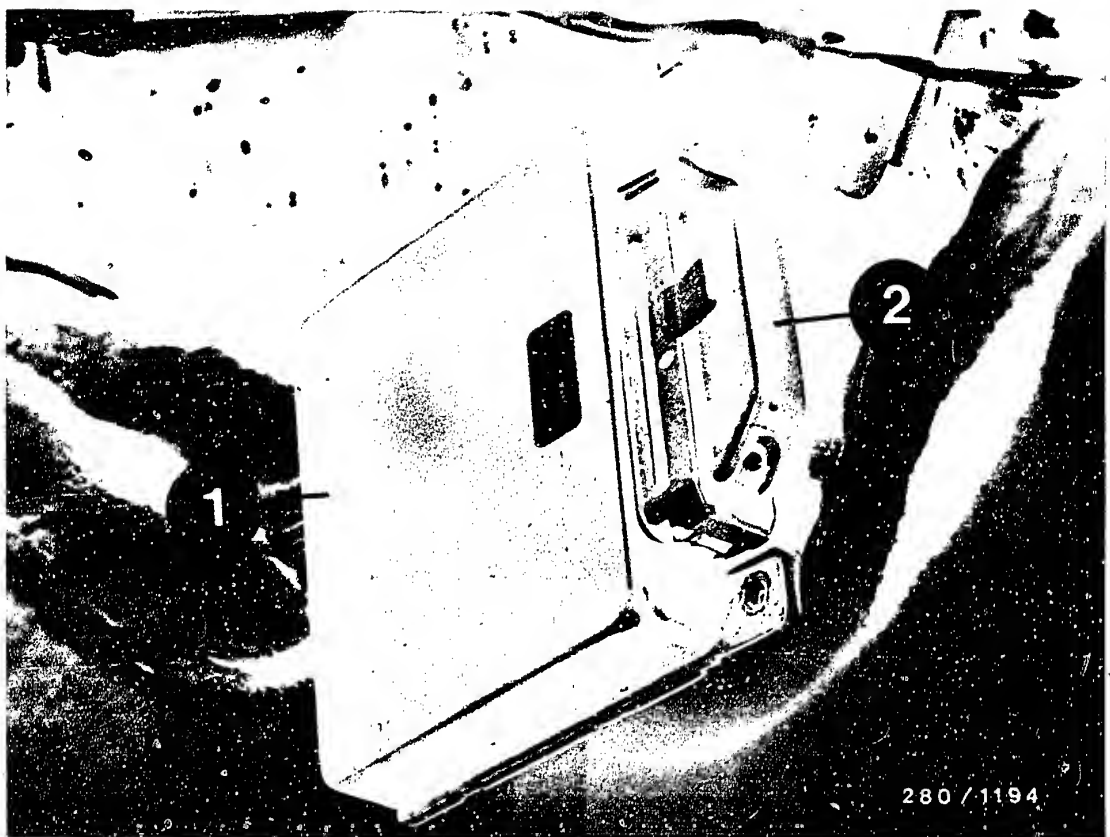
- 1 = Pressure regulator
- 2 = Screw connector (M14 x 1.5)
- 3 = Fuel return

FUEL PRESSURE TEST

Use pressure gauge and hose line of pressure tester KDJE-P 100 for the pressure test.

Connect connecting part KDJE-P 100/14 at connector in-between fuel-distribution pipe and pressure regulator, and connect hose line with pressure gauge to lateral threaded fitting.

Caution: When opening the screw connection, make sure that no fuel gets onto hot parts of the engine.



- 1 = Control unit
2 = 25-pin control-unit plug

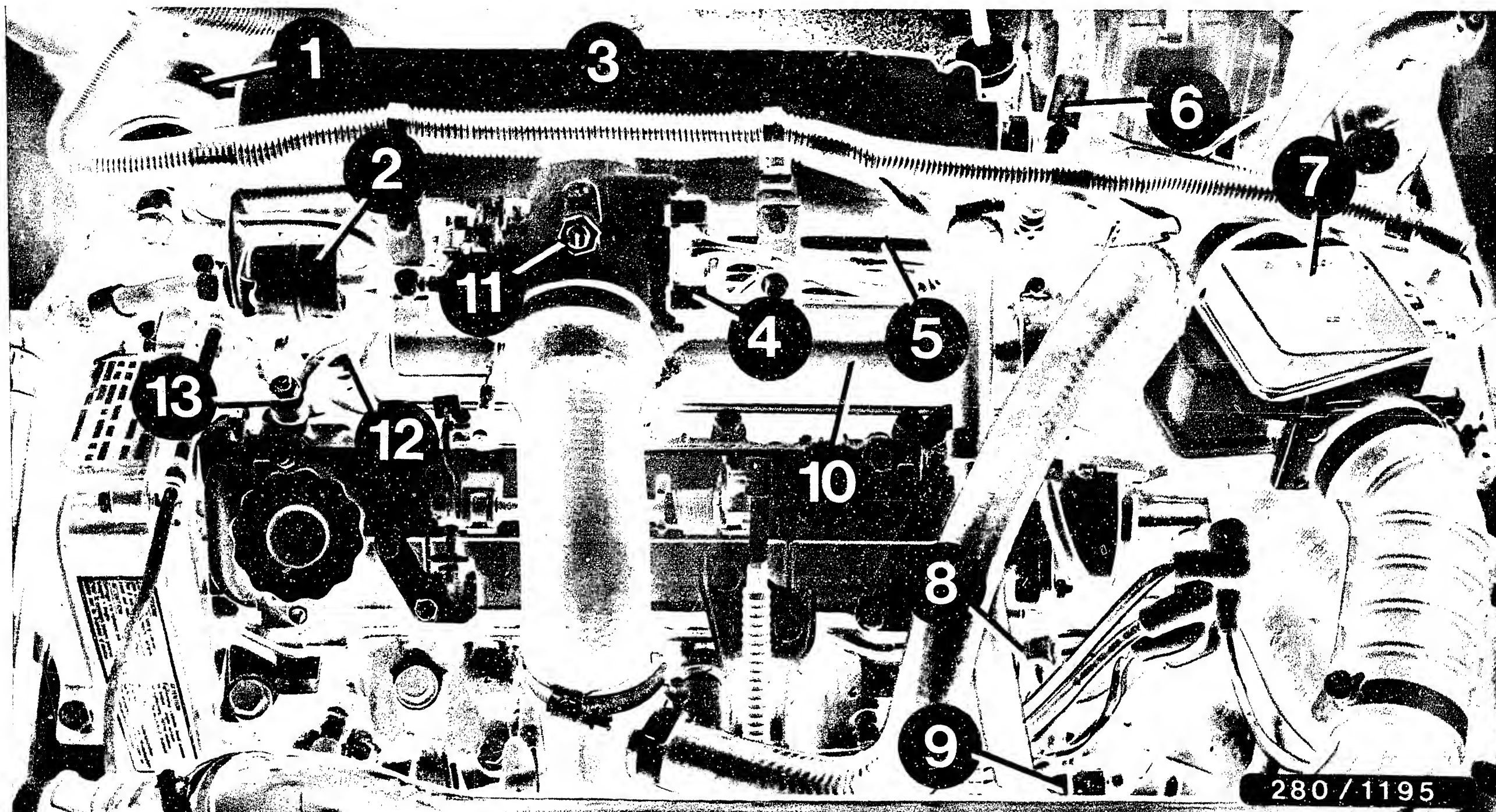
Installation position of components

- Control unit in passenger compartment
The indications "right" and "left" apply always as viewed in the forward direction of travel.

The control unit is in the passenger compartment under the glove compartment.

For electrical testing, connect universal test adapter with 25-pin adapter lead to control-unit plug.





● Arrangement of components on engine

- 1 = Fuel filter
- 2 = Pressure regulator
- 3 = Intake manifold
- 4 = Throttle-valve switch
- 5 = Fuel-distribution pipe
- 6 = Delivery line-Inlet

- 7 = Air-flow sensor
- 8 = Temperature sensor
- 9 = Auxiliary-air device
- 10 = Air distributor and thermo-switch
for injection-valve cooling

- 11 = Idle-speed bypass screw
- 12 = Injection valves
- 13 = Ground terminal

B 16

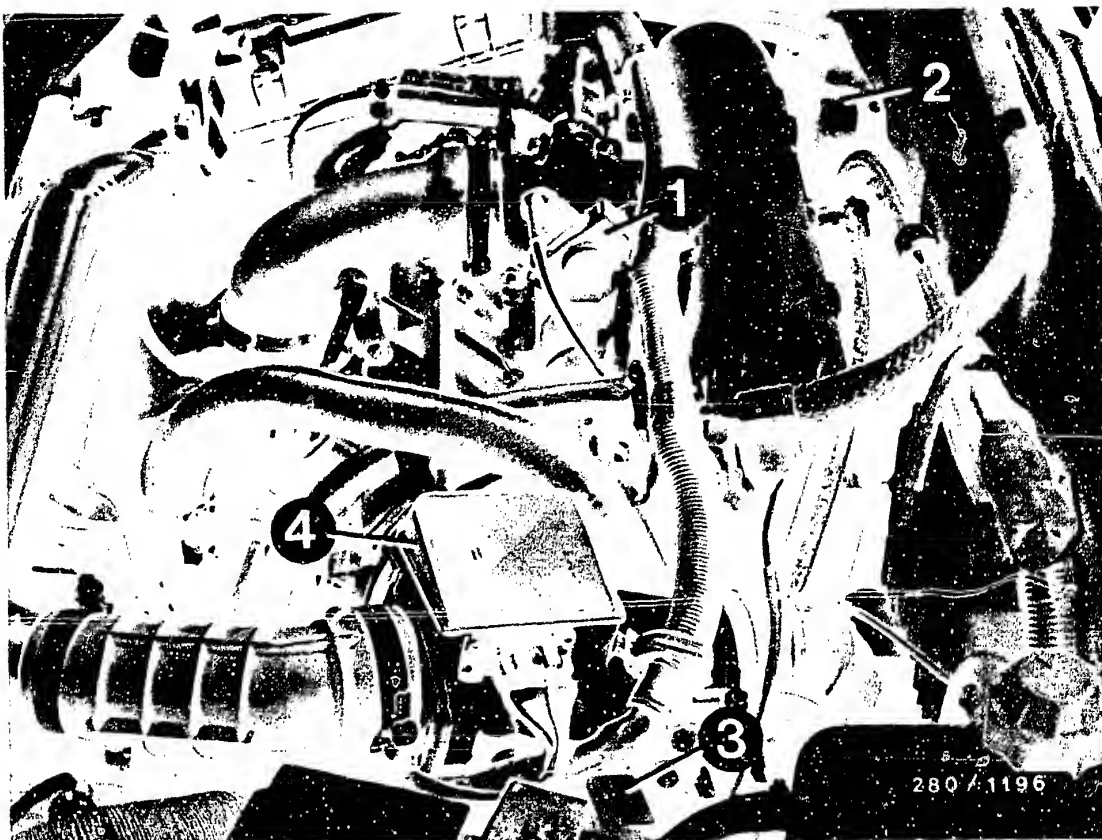
Installation position of components
Fiat



B 17

Installation position of components
Fiat





- 1 = Throttle-valve switch
- 2 = Fuel filter
- 3 = Control relay
- 4 = Air-flow sensor

Fuel-supply components

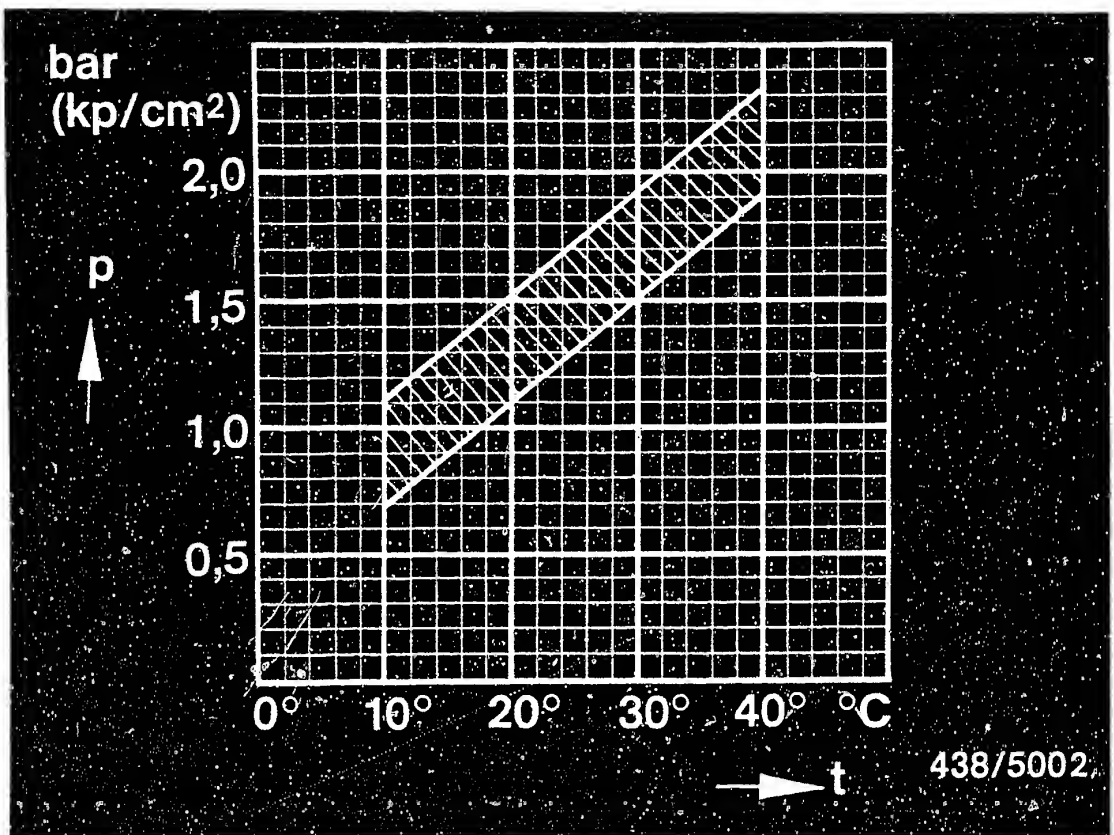
Prefilter and electric fuel pump with fuel-line-pressure damper are installed transversely in front of the fuel tank.



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6. Installation position of individual components.....	C 16





p = Control pressure (gauge pressure)
t = Ambient temperature

1. Test specifications

1.1 "Cold" control pressure

(Warm-up regulator part no.: 0 438 140 122)

For testing, connect vacuum pump to manifold-pressure connection of warm-up regulator.

Setting value: 500...550 mbar
(375 ... 412 mmHg)



Test step

Test specifications*

1.2 "warm" control pressure

Warm-up regulator part no: 0 438 140 122
(Version for manifold-pressure-
controlled full-load enrichment)

- Test with atmospheric
pressure
(without vacuum): 2.1 ... 2.5 bar
(2.2 ... 2.6 kgf/cm²)

- For testing, connect vacuum
pump to manifold connection
of warm-up regulator

Setting value
500 ... 550 mbar
(375...412 mmHg): 3.4 ... 3.8 bar
(3.5 ... 3.9 kgf/cm²)

- Leak test on full-load
diaphragm.

Max. pressure drop from
setting value: 100 mbar
(75 mmHg) / 15 s

* Pressures in the test-specification table are given
in bar (gauge pressure) and in kgf/cm² (gauge
pressure).

1.3 Electric fuel pump

Fuel delivery

Test specification: min. 950 cm³ / 30 s



Test step	Test specifications*
-----------	----------------------

1.4 Primary pressure

(Fuel distributor: 0 438 100 134)

Checking value: 5.2...5.9 bar (5.3...6.0 kgf/cm²)

Setting value: 5.4...5.6 bar (5.5...5.7 kgf/cm²)

1.5 Leak test

(Fuel accumulator: 0 438 170 036)

Minimum pressure

after 10 minutes: 3.5 bar (3.6 kgf/cm²)

after 20 minutes: 3.4 bar (3.5 kgf/cm²)

1.6 Injection valves

(0 437 502 025)

Opening pressure: 3.5...4.6 bar
(3.6...4.7 kgf/cm²)

1.7 Fuel distributor

0 438 100 134

Comparative measurement of delivery from out- lets:	Setting point	Max. allowable delivery
Idle	6.0 cm ³ /min	6.8 cm ³ /min
Part load	40.0 cm ³ /min	44.0 cm ³ /min
Full load	145.0 cm ³ /min	160.0 cm ³ /min

Note:

The full-load setting value must be reached at least at each outlet.

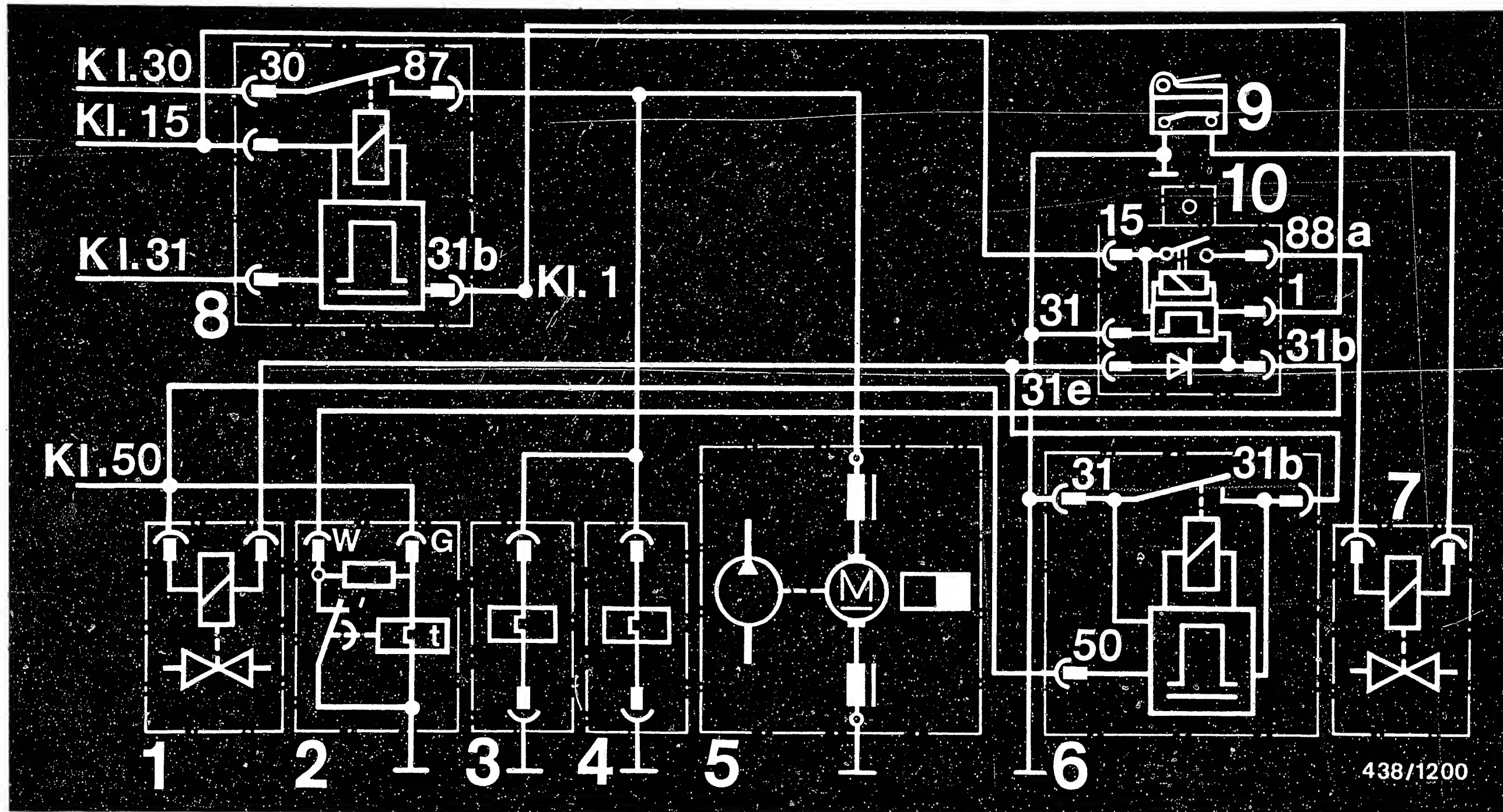
1.8 Idle adjustment

Idle speed: 875...925 min⁻¹

CO concentration: 1.0...1.5% by volume CO

* Pressures in the test-specification table are given in bar (gauge pressure) and in kgf/cm² (gauge pressure).





438/1200

2. Electrical safety circuit

- 1 = Start valve
- 2 = Thermo-time switch
- 3 = Warm-up regulator
- 4 = Auxiliary-air device

- 5 = Electric fuel pump
- 6 = Hot-start time-pulse relay (Sweden/Switzerland only)
- 7 = Overrun cutoff valve
- 8 = Safety circuit engine-speed relay (pump relay)

- 9 = Throttle-valve switch (insulated idle stop)
- 10 = Engine-speed relay (overrun cutoff)

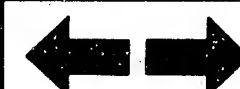
C5

Electrical safety circuit
Ford Sierra XR 4i



C6

Electrical safety circuit
Ford Sierra XR 4i



2.1 Relay of safety circuit:

The electronic engine-speed relay for the safety circuit is on the right-hand side of the vehicle, under the instrument panel, in the area behind the glove compartment.

The relay housing has the colour violet and is clamp-mounted on a bracket.

To remove, it is sufficient to remove the footwell cover under the instrument panel.

Due to the long cable, once loosened, the relay can be removed from below with the plug-in base connected.

2.2 Bridging the safety circuit for carrying out test operations:

Remove relay from plug-in base and bridge contacts 30 and 87 with an auxiliary cable.

The electric fuel pump, warm-up regulator and auxiliary-air device are now supplied with battery voltage.

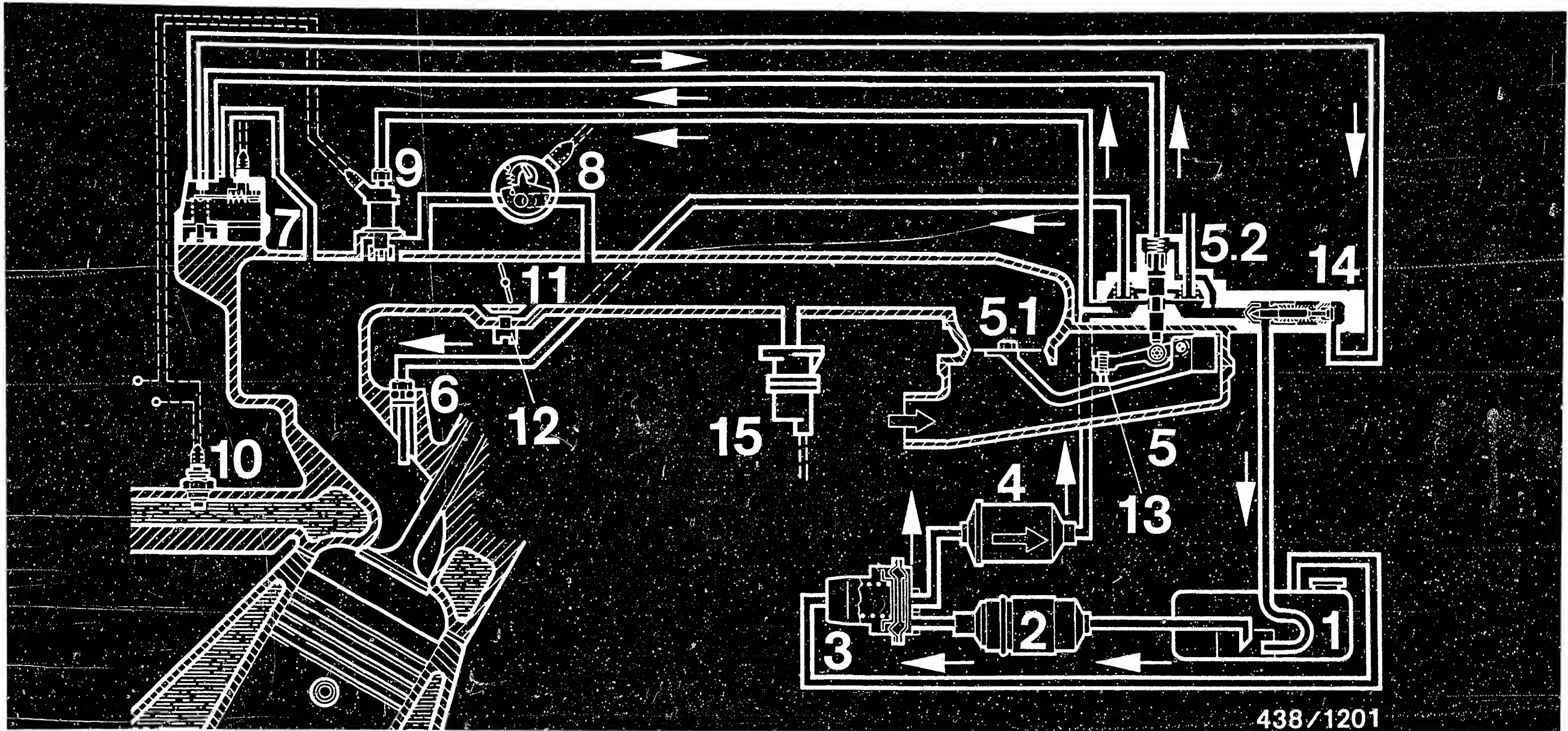
Equip the auxiliary cable with a fuse holder and 16 A fuse.

CAUTION!

Never deflect (raise) the air-flow sensor plate with the electric fuel pump operating since fuel will be injected through the injection valves.

Subsequent operation of the starting motor may lead to serious engine damage.





3. Diagram of fuel lines:

- 1 = Fuel tank
- 2 = Electric fuel pump
- 3 = Fuel accumulator
- 4 = Fuel filter
- 5 = Mixture-control unit
- 5.1 = Air-flow sensor

- 5.2 = Fuel distributor
- 6 = Injection valve
- 7 = Warm-up regulator
- 8 = Auxiliary-air device
- 9 = Start valve
- 10 = Thermo-time switch

- 11 = Throttle valve
- 12 = Idle-speed screw (bypass)
- 13 = Idle-mixture-adjusting screw
- 14 = Primary-pressure regulator with push valve
- 15 = Overrun cutoff valve

C8

Diagram of fuel lines
Ford Sierra XR 4i



C9

Diagram of fuel lines
Ford Sierra XR 4i



4. General safety instructions for work on the K-Jetronic

- Never deflect (raise) the air-flow sensor plate with the electric fuel pump operating since fuel will be injected through the injection valves.
Subsequent operation of the starting motor may lead to serious engine damage.
- Follow the instructions on test media for testing the injection valves with valve tester.
Never test using gasoline or other easily inflammable liquids.
Even when using special test gasoline, observe the local safety regulations.
- Perform leak test on engine intake system only with permissible leak-detector spray (e.g. Gypoflex).
Do not use any easily inflammable liquids. Observe local safety regulations.



5. Special features of this vehicle model

- Equipped as standard with overrun cutoff.
- Consumption measurement by means of flowmeter which is connected into the injection line of cylinder 5.
- Sweden/Switzerland models with time-pulse relay for energizing the start valve during hot starting.

5.1 Overrun cutoff

The Ford Sierra XR 4i is equipped as standard with overrun cutoff.

This means that the injection of fuel is discontinued on overrun with the throttle closed.

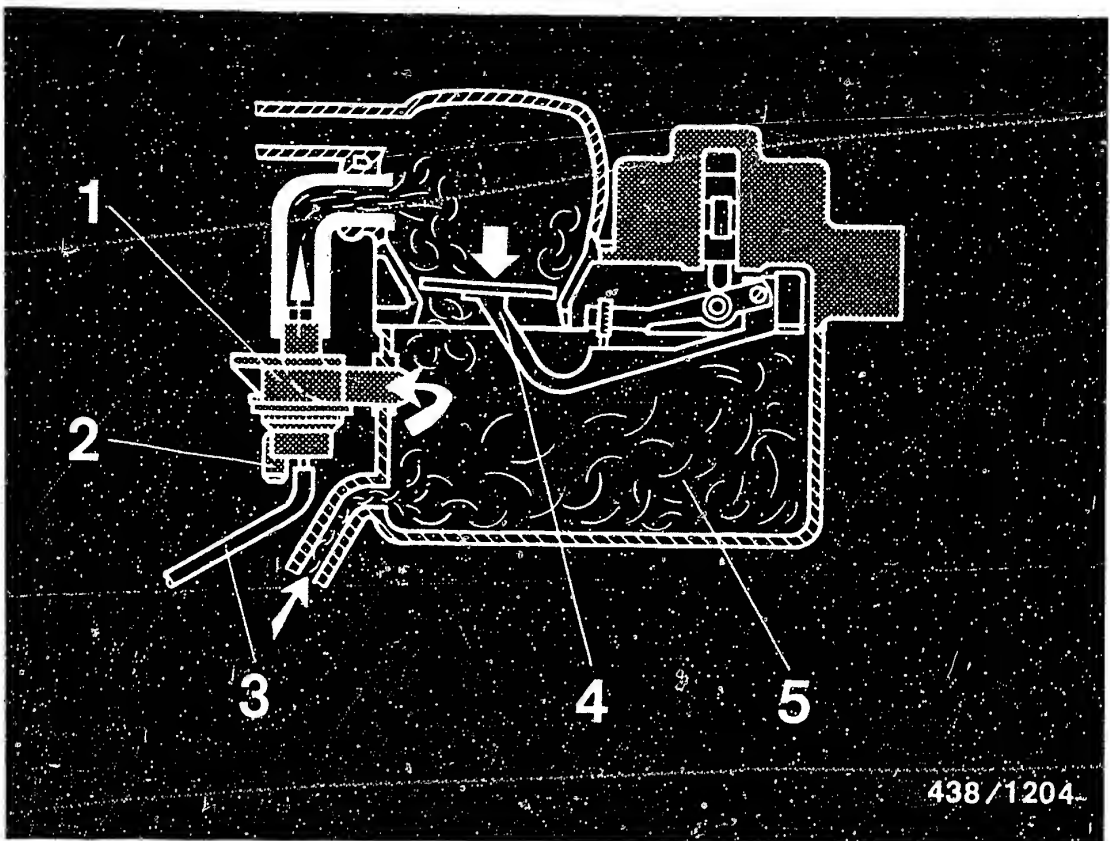
To prevent the engine from stalling when coasting and declutching, the injection of fuel is reinstated before the idle speed is reached.

The overrun cutoff valve is mounted below the mixture-control unit, directly on the air-filter housing.

Note:

Basically, the overrun cutoff of the Sierra XR 4i is the same as the retrofittable overrun cutoff developed by Bosch for various other K-Jetronic vehicles. The differences are the design of the engine-speed relay and the insulated idle stop of the throttle valve which replaces the microswitch.





Arrangement of overrun cutoff valve in air system

- 1 = Overrun cutoff valve
- 2 = Electrical connection
- 3 = Connection for manifold pressure (vacuum)
- 4 = Air-flow sensor with sensor plate
- 5 = Air-filter housing

Operation of overrun cutoff:

The discontinuation of fuel injection is caused by a pneumatically and electrically energized air bypass valve (BOSCH product)*which is connected in the air-intake system both before and after the air-flow sensor. On overrun this valve is opened with the result that the intake air flows not through the air-flow sensor, but through the valve. Consequently, the sensor plate drops back onto its mechanical stop, the metering slits in the fuel distributor are closed - and the injection of fuel is thus discontinued.

The switching of the air bypass valve is by means of application of vacuum from the engine intake system whereby the application of vacuum is controlled by a solenoid-operated valve (contained in the air bypass valve).

The electrical positive (+) energization of the solenoid-operated valve is by means of a separate engine-speed relay (BOSCH product).

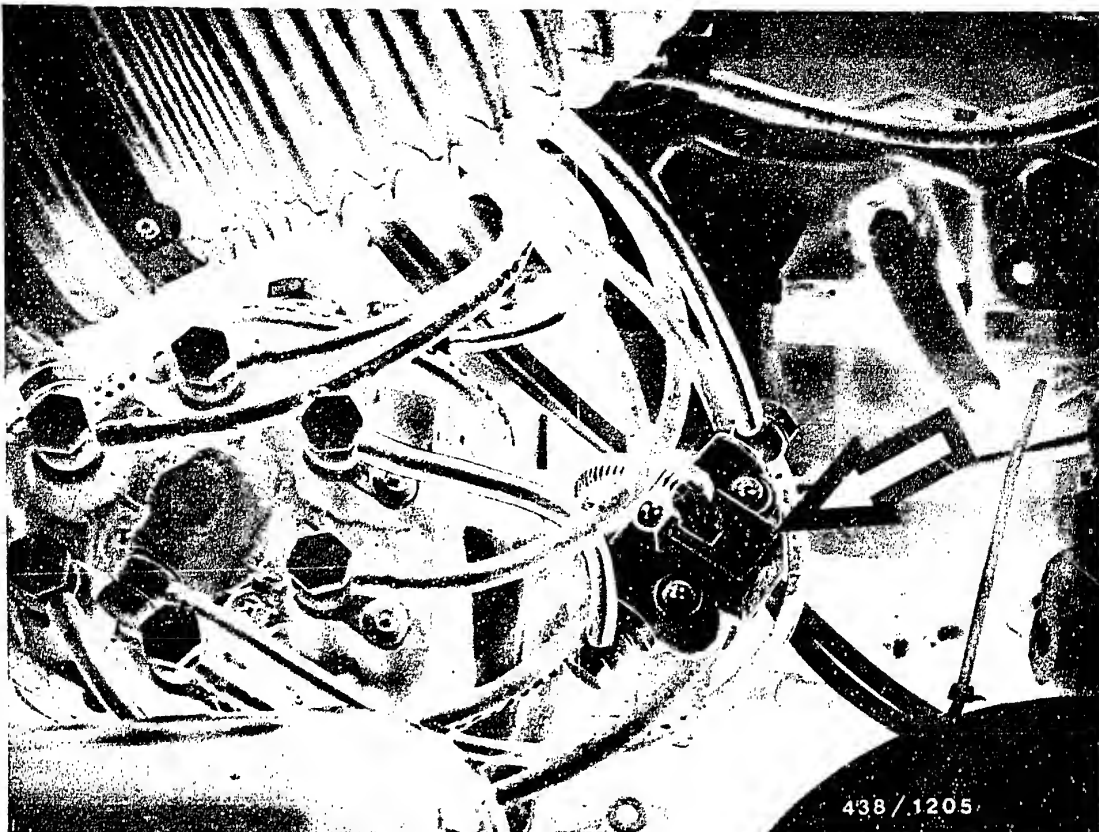
The negative (-) energization is by means of an insulated idle stop on the throttle-valve assembly which acts as a switch and is closed when the throttle valve is closed.

When the engine is cold and during the warm-up phase, the overrun cutoff system is inoperative.

This is achieved by means of the engine-speed relay (overrun cutoff relay) as a function of the switching point of the thermo-time switch, i.e. up to an engine temperature of approx. + 35°C.

The engine-speed relay for the overrun cutoff is on an apron panel on the left-hand side in the engine compartment, in the direct vicinity of the ignition trigger box.





5.2 Consumption measurement

A flowmeter (arrow) for the consumption indicator is connected into the injection line of the 5th fuel-distributor outlet (not a BOSCH product). The instantaneous delivery measured at this outlet is used by the computer to calculate the overall delivery for all cylinders.

The connection of this device into one of the injection lines has no influence on the operation of the K-Jetronic. However, when trouble-shooting, the influence of a possible defect in the flowmeter should be borne in mind (e.g. rough idling, imbalance of fuel deliveries).



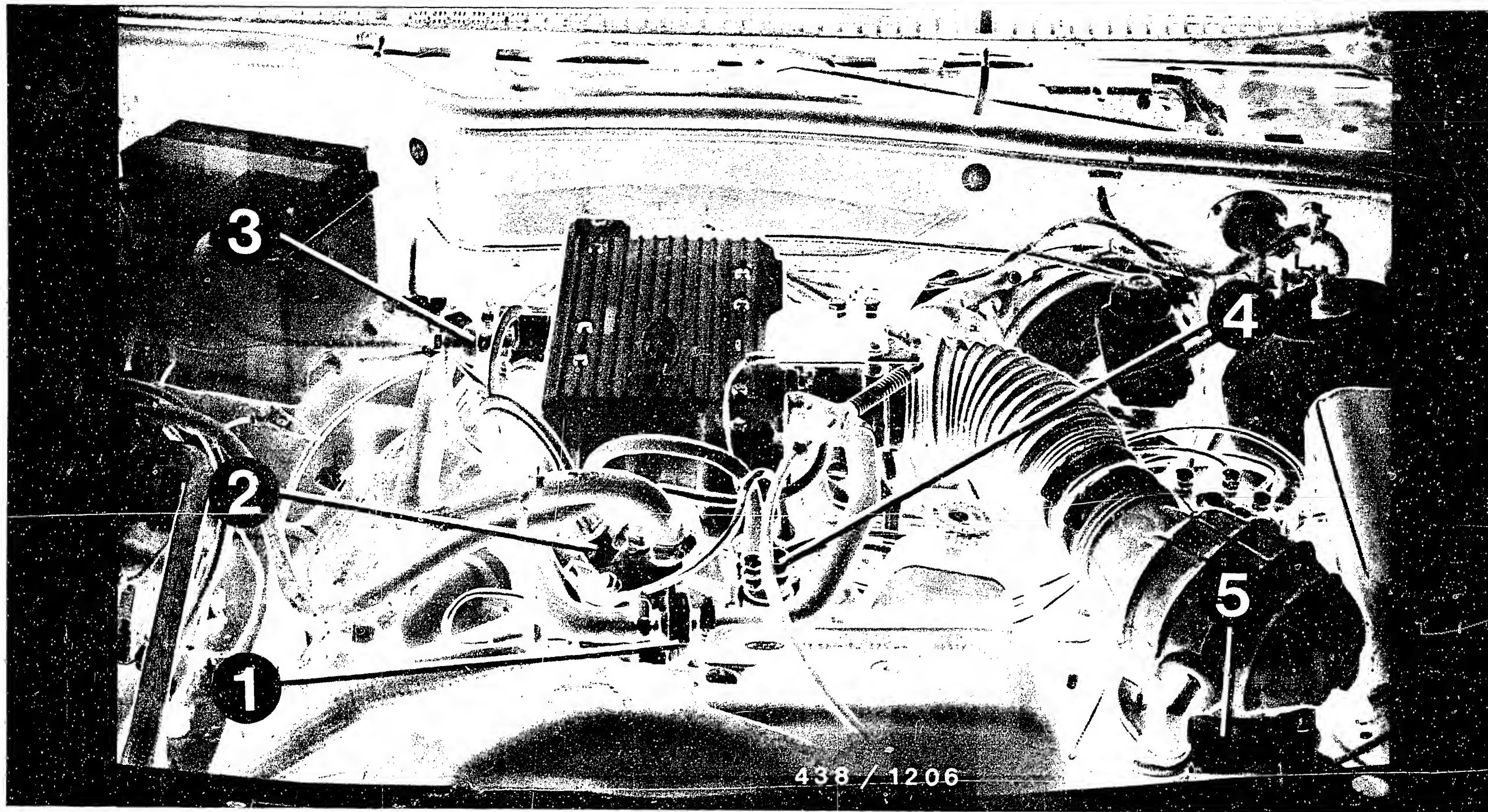
5.3 Time-pulse relay

Hot-starting aid for Sweden and Switzerland models:

Vehicles of the Sweden/Switzerland version are equipped with a time-pulse relay which intermittently energizes the start valve while the starting motor is being operated. This function is operative when the engine is warm and at a temperature above the switching point of the thermo-time switch (+ 35°C). Thus, during hot starting, extra fuel is injected through the intake manifold.

The time-pulse relay is situated behind the instrument panel, on the steering-column bracket.





6. Installation position of individual components

6.1 Arrangement of components in region of engine

1 = Start valve
2 = Thermo-time switch

3 = Warm-up regulator
4 = Auxiliary-air device

5 = Mixture-control unit

C16

Installation position of components
Ford Sierra XR 4i



C17

Installation position of components
Ford Sierra YR 4i



● Injection valves

The injection valves are inserted into appropriate mounting holes in the flanges of the intake ports, below the air-intake housing, and are secured by holding disks.

● Fuel filter

The fuel filter is in the engine compartment under the air-filter housing.

● Electric fuel pump and fuel accumulator

Both components are mounted on a common bracket which is installed on the underside of the vehicle on the spare wheel well.



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2. Connection diagram, preheater unit.....	D 4
3. Tools	D 6
4. Taking out the fuel-injection pump	D 7
5. Putting in the fuel-injection pump	D 9
6. Checking and adjusting engine timing	D 17



1. Test specifications

1.1 Idle speed: 800...850 min⁻¹
Fast idle 1250...1300 min⁻¹

1.2 Nozzle opening pressure: 130 + 5 bar

1.3 Injection timing:

Check value 4th cylinder
Engine setting: 0.69...0.75 mm BTDC

Setting value 4th cylinder
Engine setting: 0.72 mm BTDC

Check value
Pump setting: 0.28...0.32 mm ABDC

Setting value
Pump setting: 0.30 mm ABDC

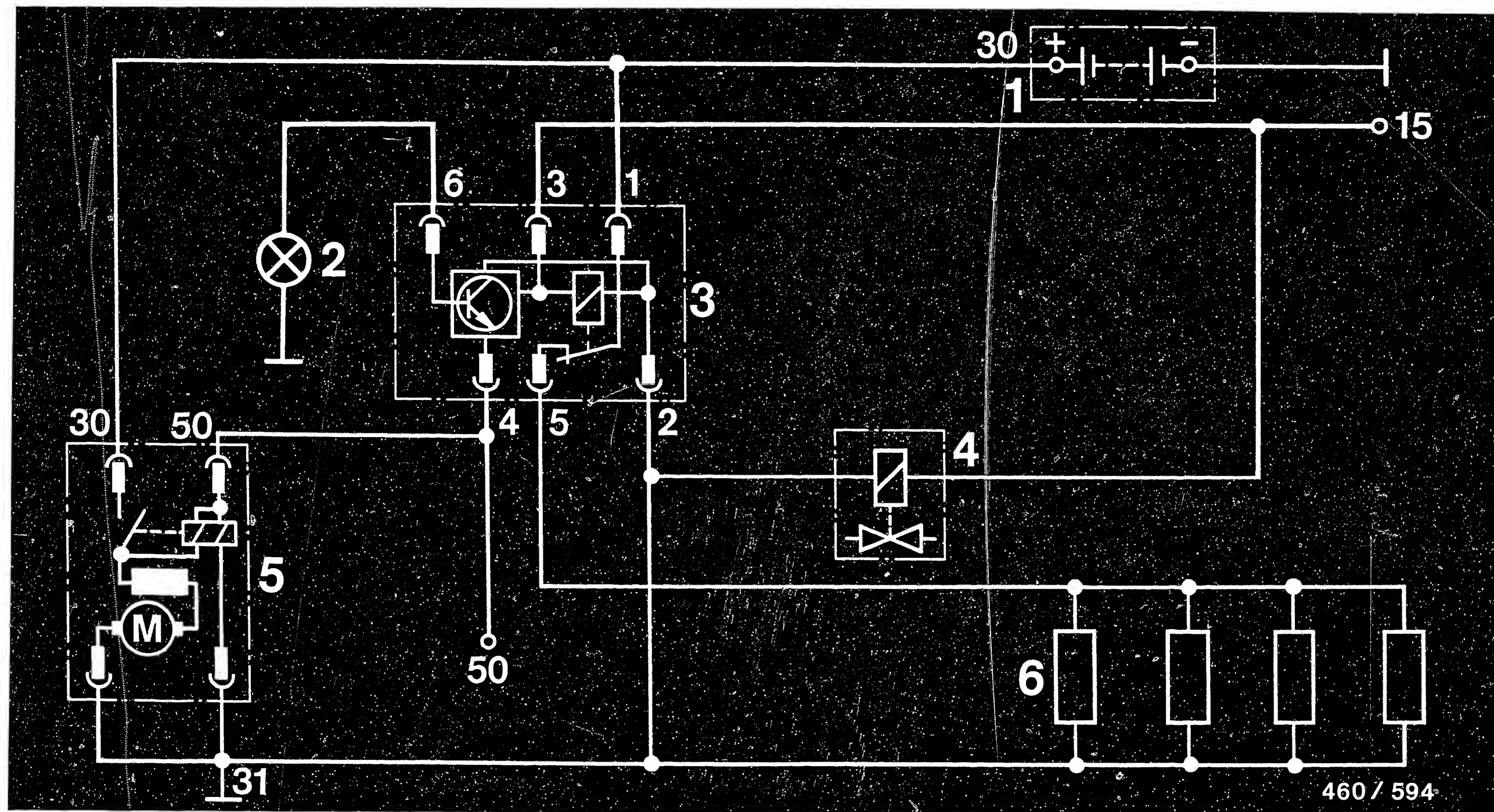
1.4 Compression pressure: 25...30 bar
max. cylinder deviation: 5 bar



1.5 Tightening torques

Fuel lines	25 Nm
Injection-pump fastening screws	20 Nm
Nozzle-holder assembly fastening screws	70 Nm
Sheathed-element glow plugs	25 Nm
Injection-pump support bracket	20 Nm
Screw plug	15 Nm
Rocker arm adjusting screw	15 Nm
Crankshaft pulley fastening nut	170 Nm
Cylinder head cover screws	7.5 Nm





1 = Battery
 2 = Glow plug indicator lamp (12 V max. 2 W)
 3 = Glow-duration unit
 4 = Solenoid-operated valve

5 = Starting motor
 6 = Glow plugs

2. Terminal diagram for preheating system

D4

Test preheating system
 Ford Granada 2,5 D



D5

Test preheating system
 Ford Granada 2,5 D

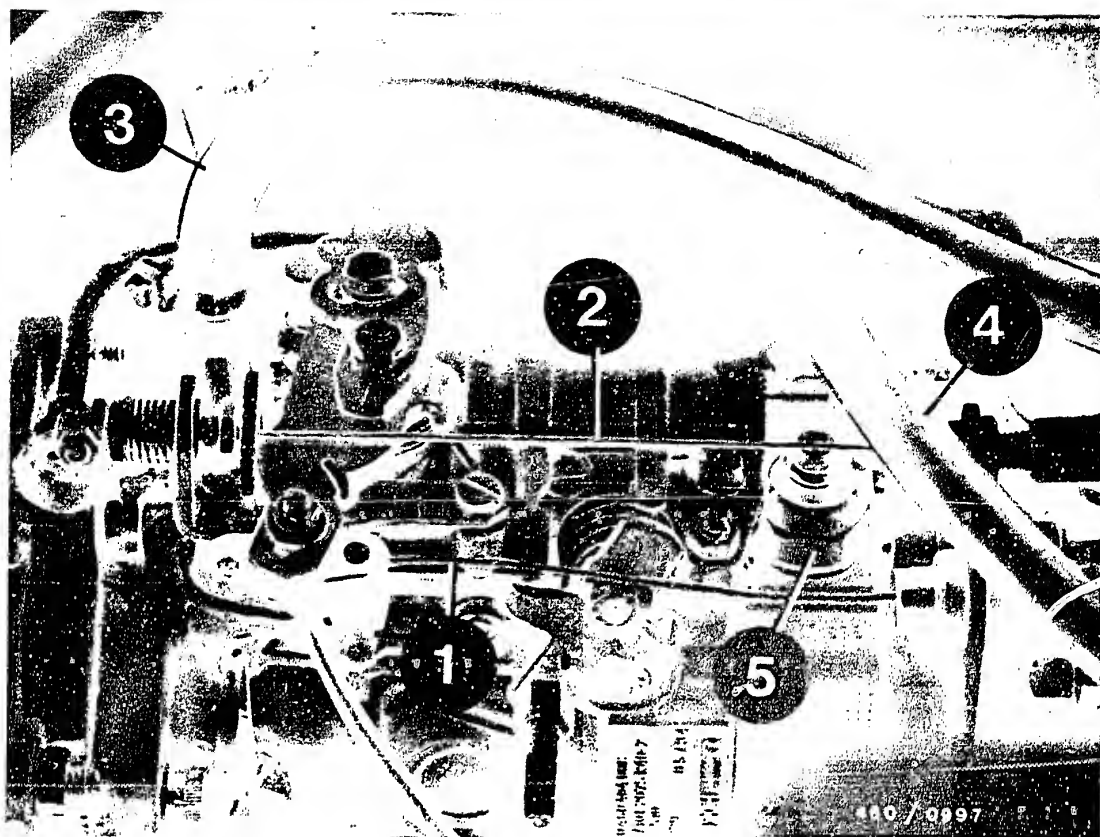


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3. Test equipment and tools

Designation	Part number	Use
Peugeot tool	8.0105 Y	Taking out the valve spring
Box wrench	KDEP 1115	Releasing/tightening fuel-inj. lines
Tester	KDEP 2991	Injection timing
Tester	KDEP 1085	Injection timing
Mini-dial indicator 1/100 mm	commercially avail., e.g., Hahn&Kolb 7000 Stuttgart Part No. 33 003 with adapter KDEP 1127	Injection timing
Tachometer	commercially avail., e.g., Dr.E. Horn GmbH Meßgerätefabrik Postfach 40 7036 Schoenaich Part dec.: HT 446 (with digital reading)	Adjusting engine speed



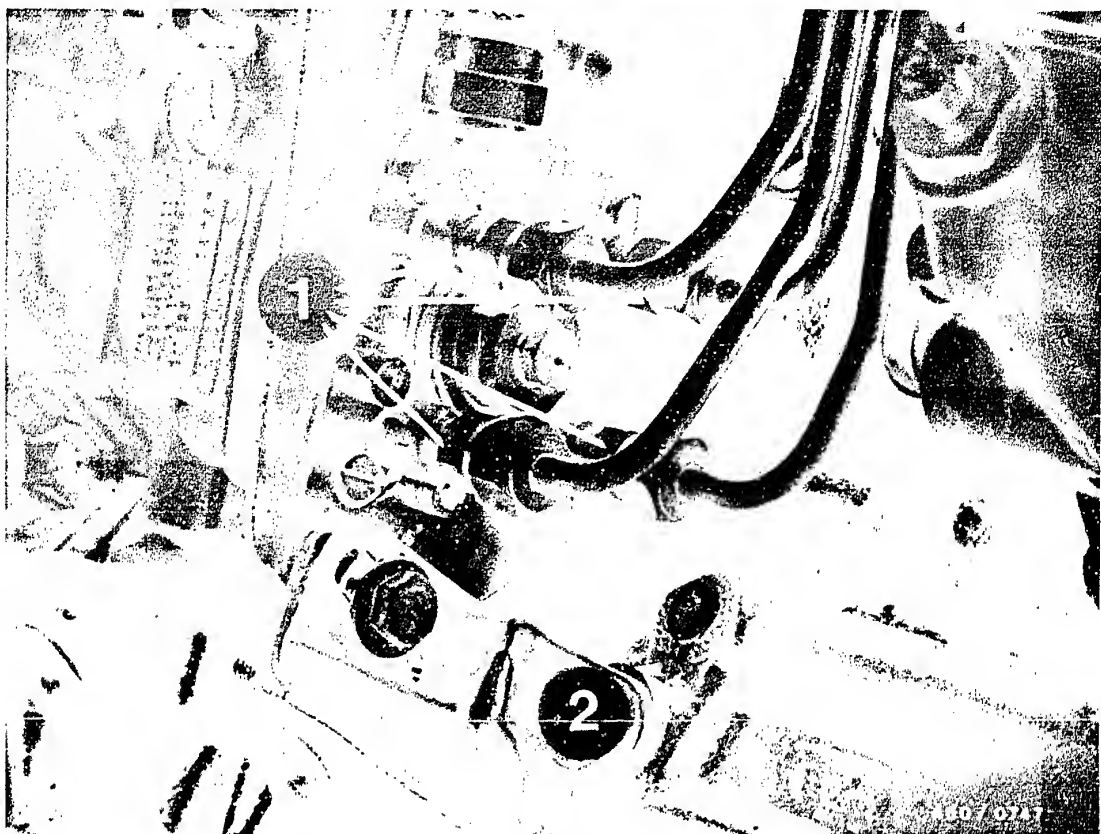


4. Taking out the fuel-injection pump

Disconnect the negative lead from the battery.

Remove the cable on the control lever of the fuel-injection pump (1), the cable for fast idle (2), the fuel supply line (3), the fuel return line (4), and the lead for the shutoff device (5).



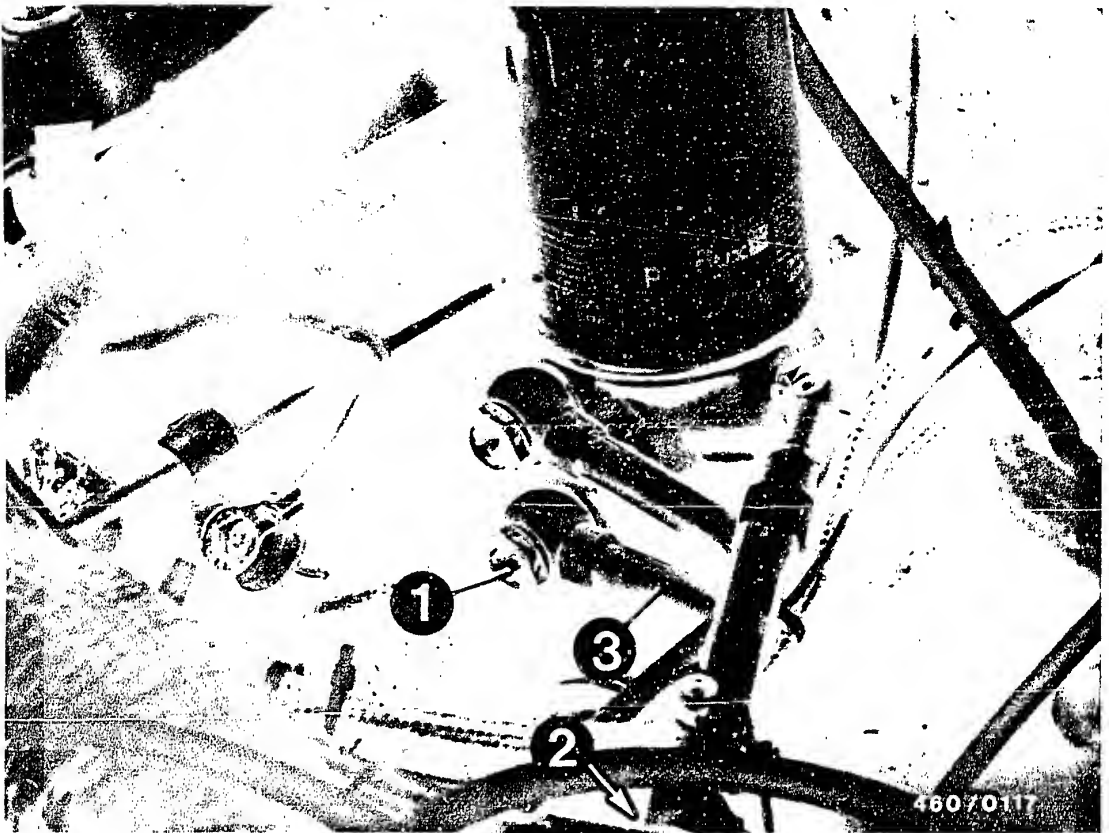


Release the fuel-injection lines (1) using open box wrench KDEP 1115. (Prevent the delivery-valve holder from becoming loose by holding it with a wrench).

Remove the support bracket (2) on the distributor body and the fastening screws of the fuel-injection pump.

Take the pump off the motor, being careful of the seal.





5. Putting in the fuel-injection pump

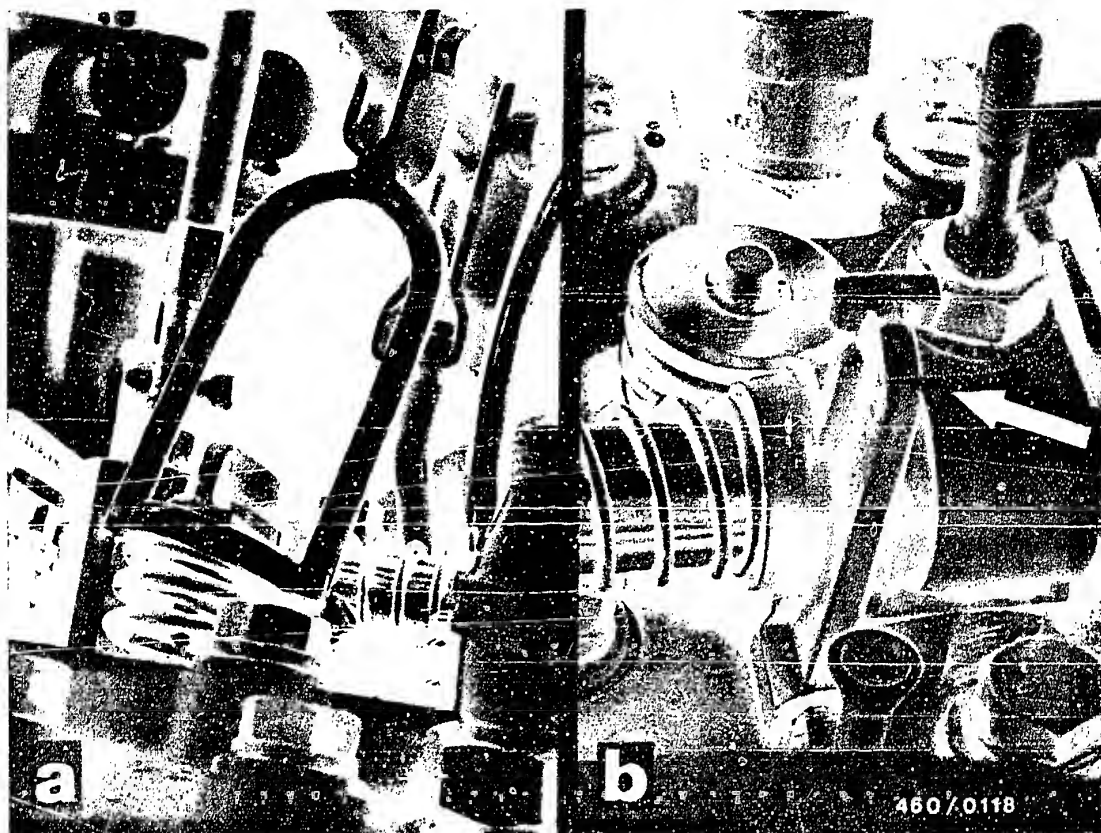
Turn the crankshaft using the box wrench.

Remove the cylinder head cover.

Unscrew the bottom fastening screw (1) on the oil filter and the screw (2) on the oil cooler.

Lay the line (3) to one side.





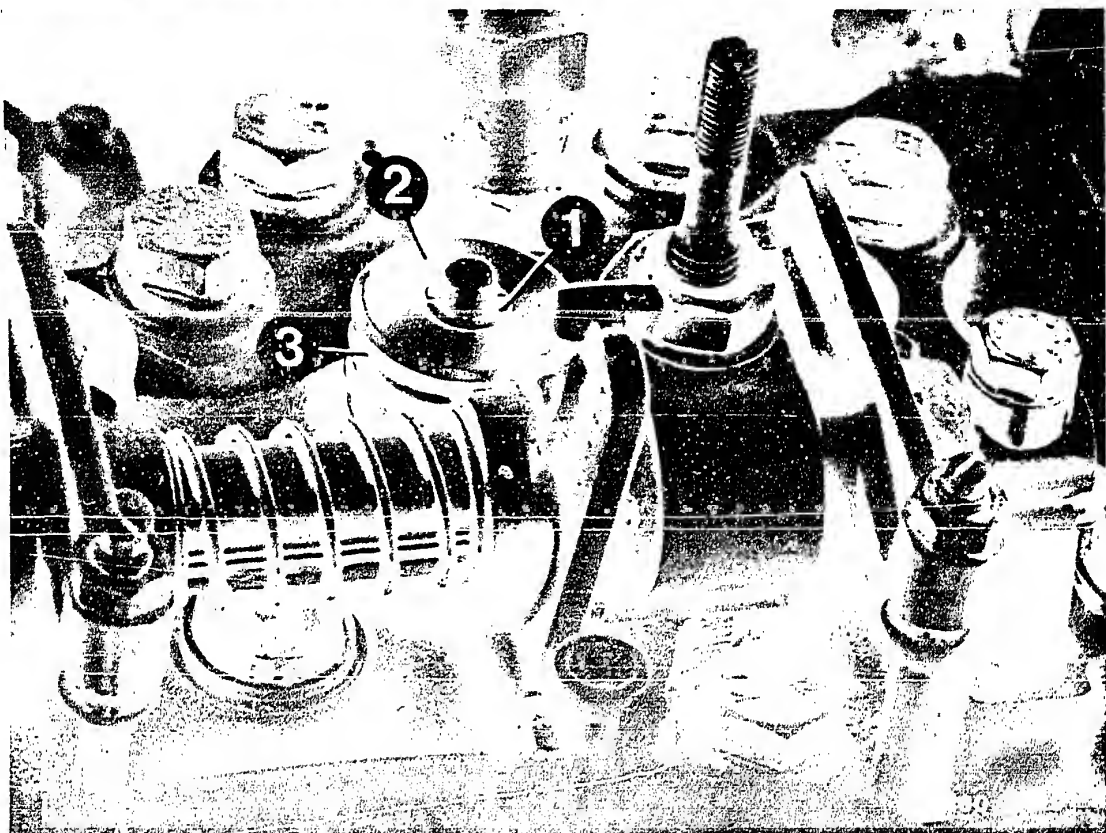
Turn crankshaft so that exhaust valve just opens with cylinder 1 in BDC position.

Hook tool 8.0105 Y into rocker arm shaft and force exhaust valve spring on cylinder 4 downward (picture, a).

Move rocker arm against compression spring on rocker arm shaft and place vertically.

In this position bring into starting position (picture, b).





Turn crankshaft in engine direction of rotation until cylinder 4 is at TDC.

The valves of cylinder 1 are on overlap.

Press exhaust valve spring of cylinder 4 downward using tool 8.0105 Y.

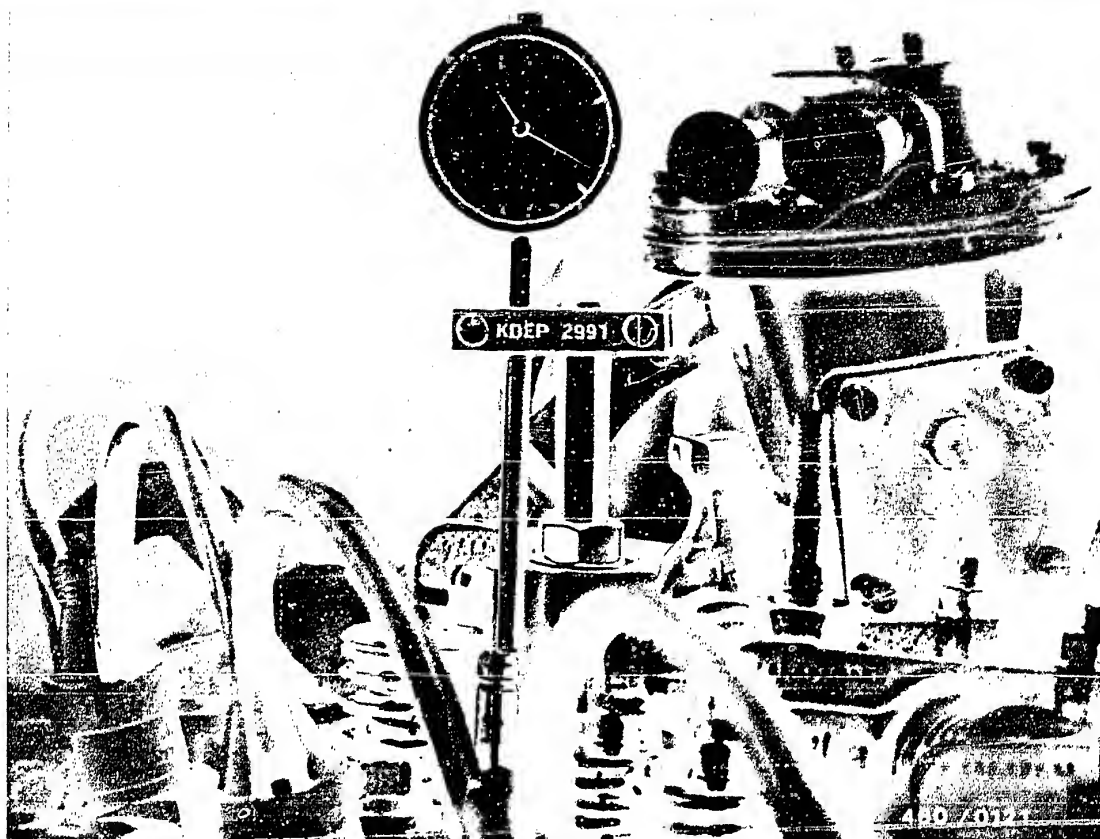
Remove collets (1) from exhaust valve.

Relax valve spring, and remove spring plate (2) and valve spring (3) from valve.

The 4th cylinder discharge valve now touches against the engine plunger.

Take out the sheathed-element glow plugs of the 3rd and 4th cylinders.





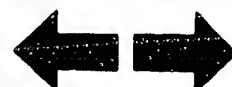
Screw measuring tool KDEP 2991 onto threaded pin of cylinder 4.

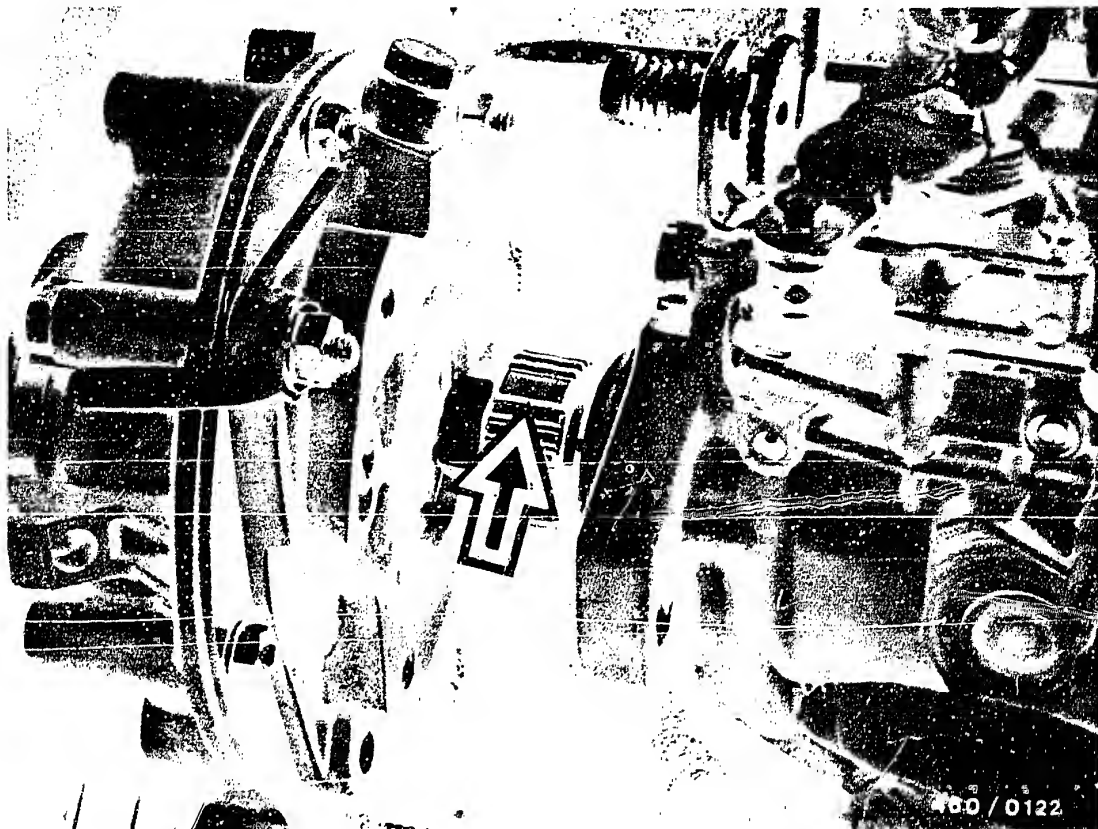
Fit dial indicator 1 687 233 012 with long measuring base into measuring tool KDEP 2991.

The measuring base rests on the exhaust valve of cylinder 4. Preload dial indicator by approx. 10 mm.

Turn crankshaft against engine direction of rotation until piston has covered a stroke of approx. 7 mm.

Turn crankshaft back in engine direction of rotation until cylinder 4 is at TDC.
Set dial indicator to "0".





Turn injection-pump drive shaft so that mark on drive pinion points approximately toward outlet "B" (see picture, arrow).

Stick new paper gasket with grease onto mounting flange for injection pump.

Introduce injection pump into engine plug-in sleeve.

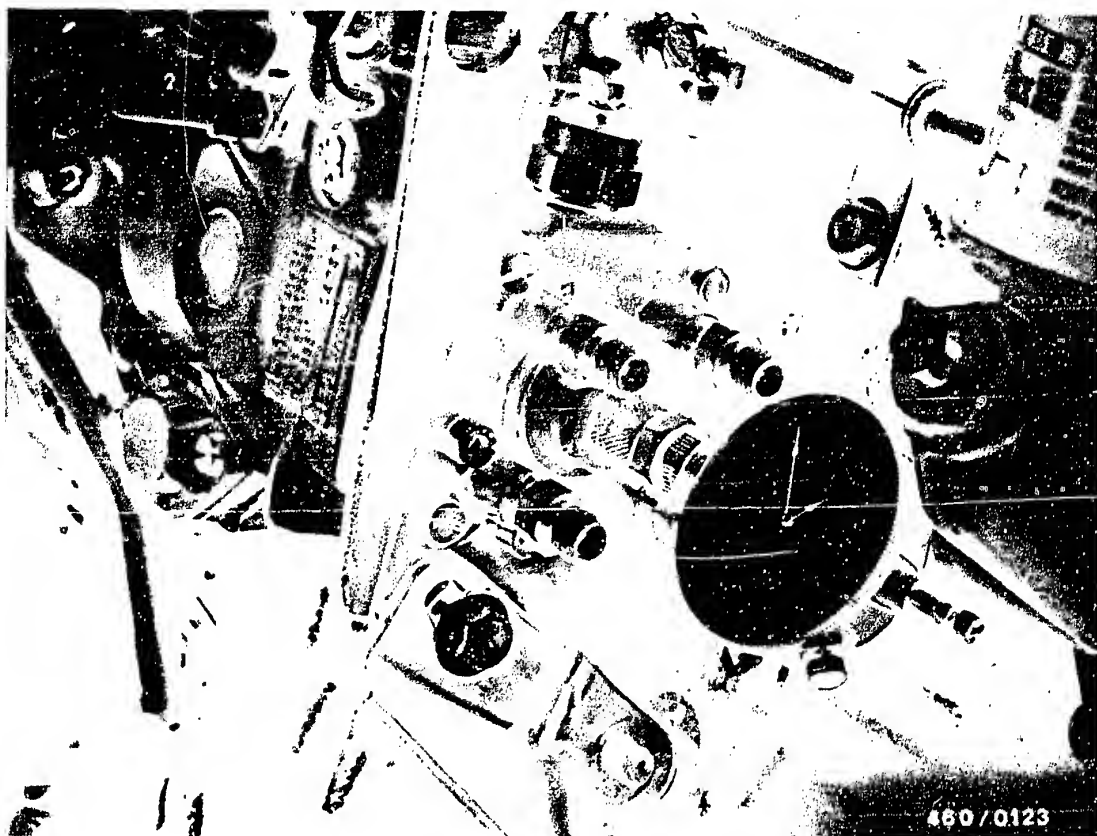
Provisionally tighten fastening screws (with hexagon socket head) of injection pump.

D13

Install fuell-injection pump

Ford Granada 2,5 D





Remove bleeder screw from central screw plug (triangular plug) of injection pump.

Screw measuring tool KDEP 1085 into bore for bleeder screw.

Mount dial indicator 1 687 233 011 or .. 012 with measuring base and preload by approx. 3 mm.

Turn crankshaft against engine direction of rotation until dial indicator indicates BDC position of injection pump plunger.

Set dial indicator to 0.



Turn the crankshaft in the direction of engine rotation until the dial indicator on the discharge valve of the 4th cylinder indicates a plunger stroke of 0.72 mm BTDC.

With the indicated plunger setting, the dial indicator on the fuel-injection pump must show a pump plunger stroke of 0.28...0.32 mm ABDC.

If need be, adjust the stroke by pivoting the fuel-injection pump. To do this, the fastening screws for the fuel-injection pump (also on the support bracket) must be released.

Then tighten the fastening screws again to 20 Nm.

Checking the setting of the fuel-injection pump with regard to the engine.

Turn the crankshaft in the direction of engine rotation until the dial indicator on the fuel-injection pump indicates a stroke of 0.30 mm.

In this setting, the plunger of the 4th cylinder must stand 0.69...0.75 mm BTDC.

Align the support bracket on the distributor body of the fuel-injection pump in such a way that it touches up against the cylinder block and the distributor body without stress.

Screw the support bracket down tight.



Put on the fuel-injection pump control-lever cable, the cable for fast idle, the fuel delivery and return lines, and the lead for the electrical shutoff device.

Note:

It is not permissible to exchange the inlet-union screws of the fuel delivery and return lines, one for the other.

The inlet-union screw of the return line has throttle bores and is marked on the head of the screw with the word "Out".

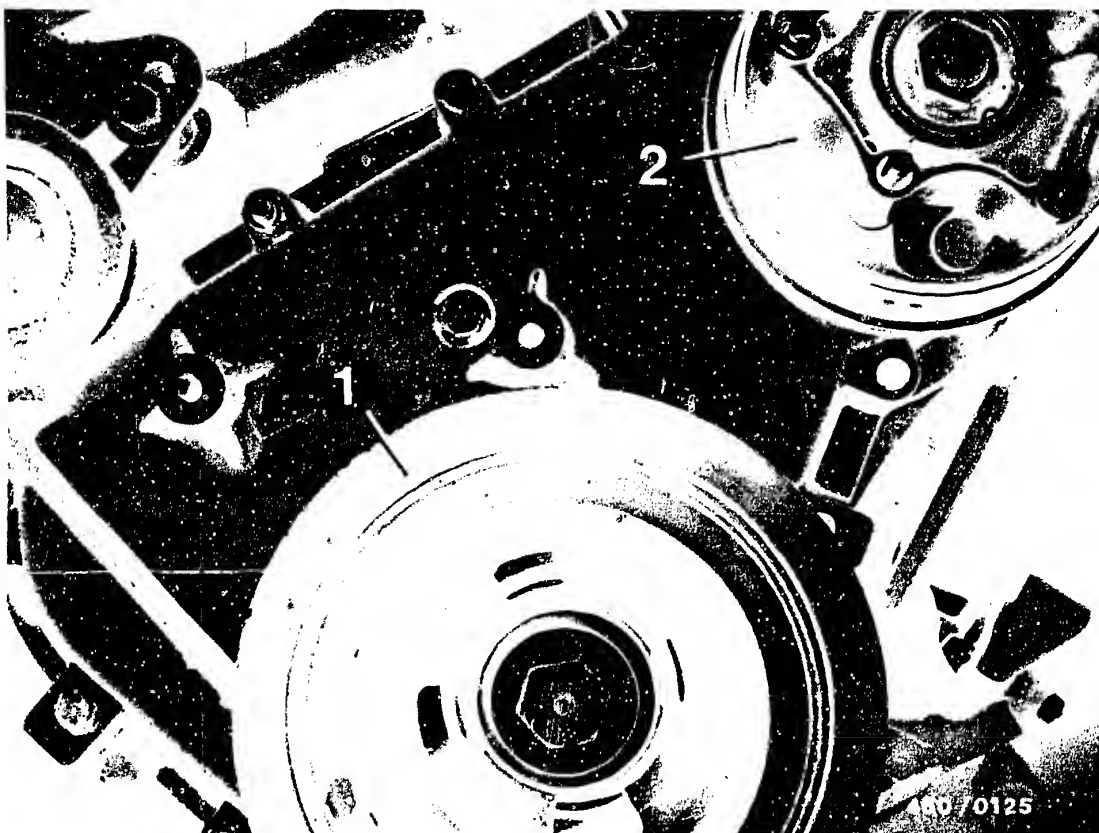
Tighten the fuel-injection lines using open box wrench KDEP 1115. (Prevent the delivery valve holder from turning by holding it with a wrench).

Put on the line from the oil cooler to the oil filter and the cylinder head cover.

Put in the sheathed-element glow plugs of the 3rd and 4th cylinders.

Connect the negative lead to the battery.





6. Checking and adjusting engine timing

6.1 Checking engine timing

Take out the fan.

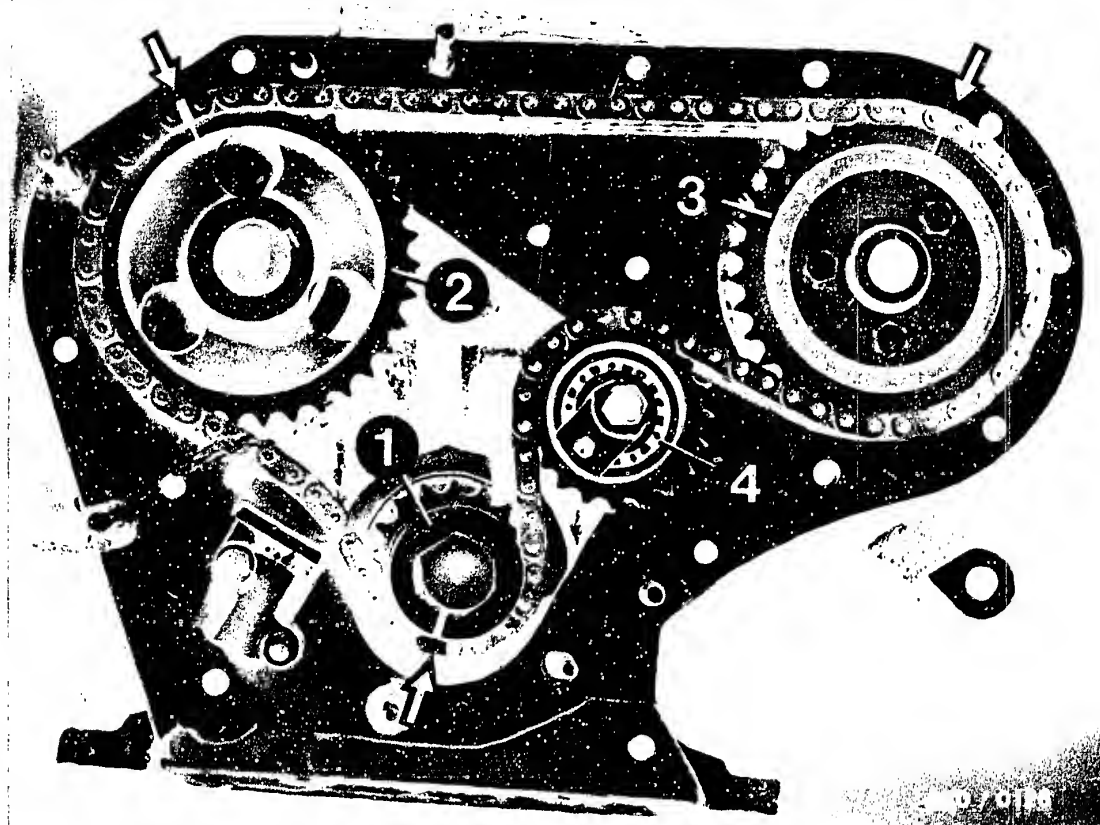
Remove crankshaft pulley (1) and fan wheel (2).

Remove V-belt for fan wheel and crankshaft pulley.

Remove timing cover.

Screw crankshaft pulley fastening screw into crankshaft gear.



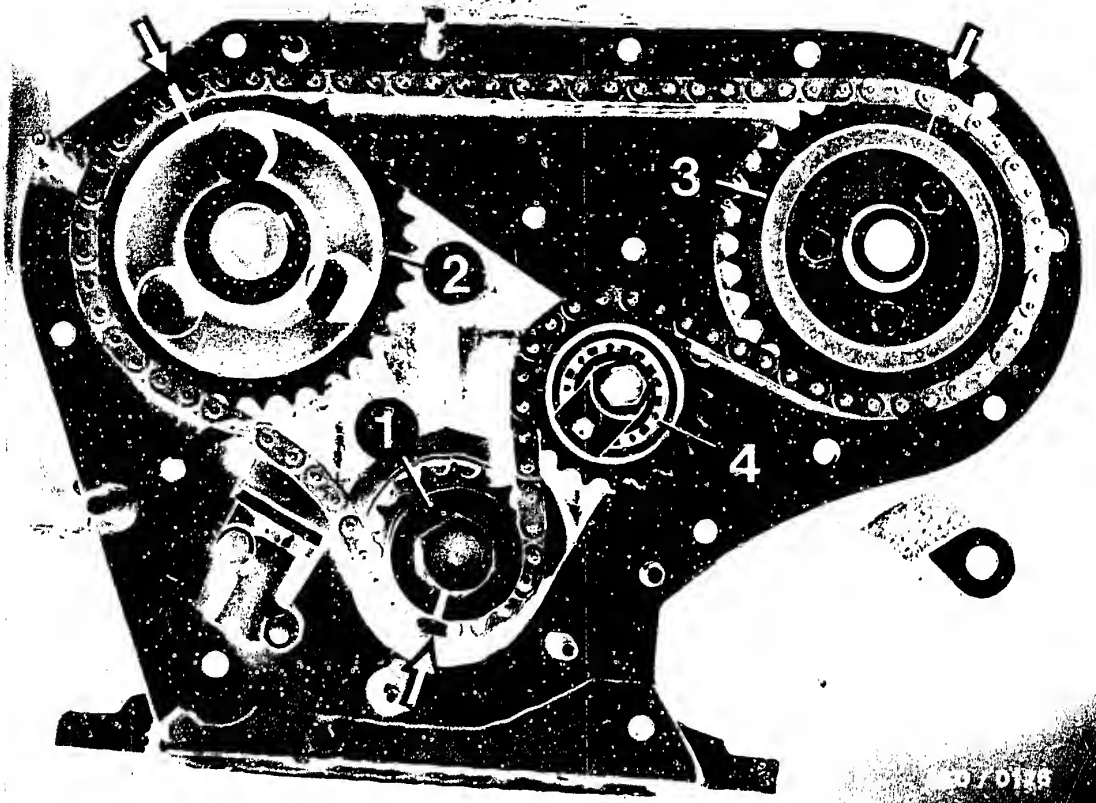


Using crankshaft gear (1), turn crankshaft in engine direction of rotation until the following marks are in alignment:

- Mark on crankshaft gear (1) and copper link in chain (arrow).
- Line marks on camshaft gear (2) and chain (arrow).
- Line marks on injection-pump drive gear (3) and chain (arrow).

If marks are not in alignment, adjust engine timing.





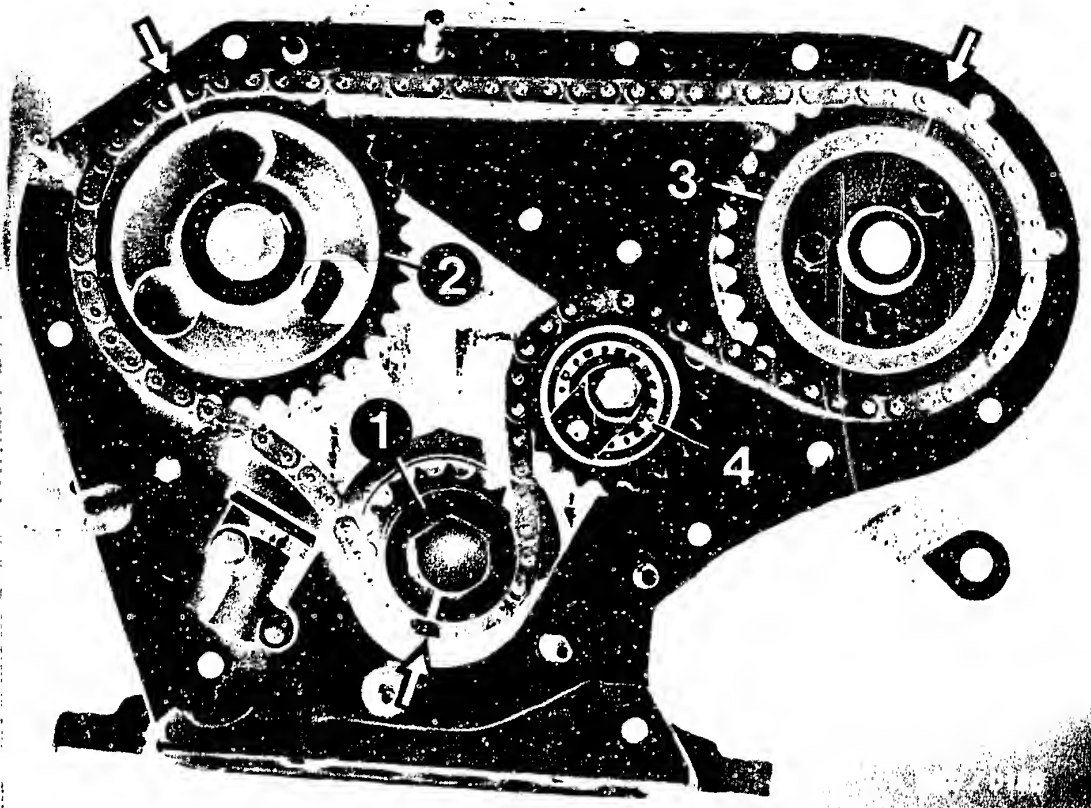
If marks are in alignment, remove hexagon screw from crankshaft gear (1).

Mount timing cover.

Install crankshaft pulley and fan wheel with V-belt.

Put on the fan.





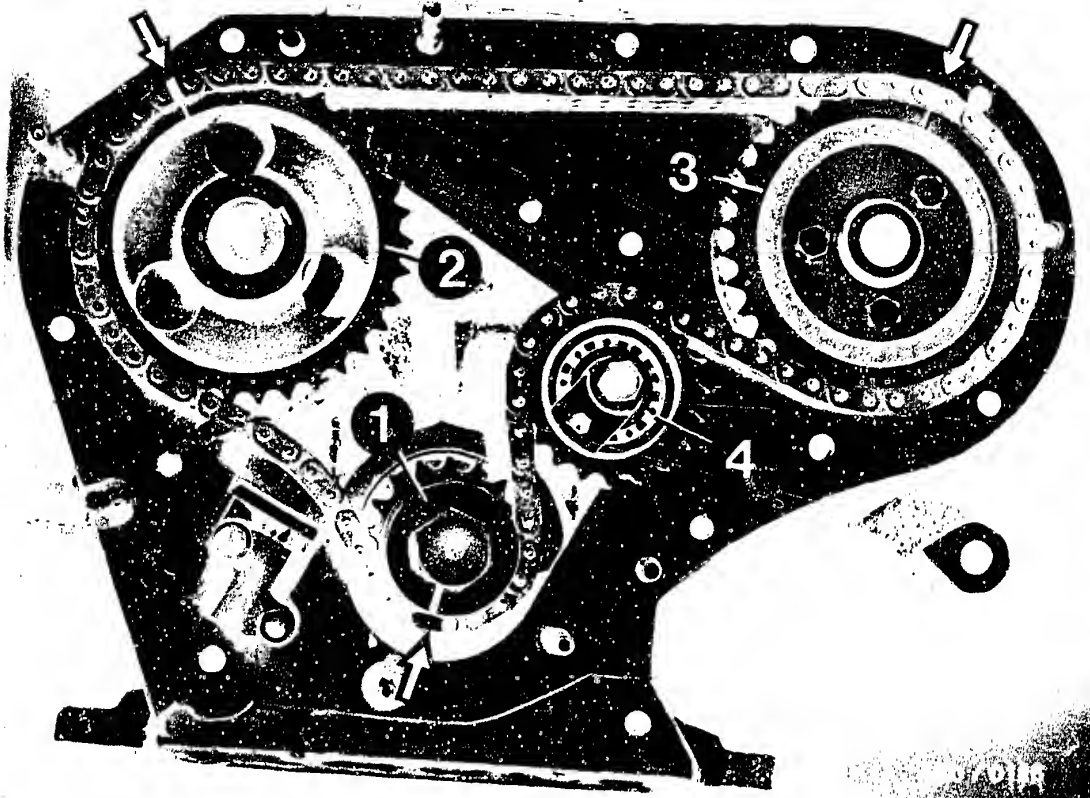
6.2 Adjust engine timing

Relax chain tensioner using 3 mm Allen wrench. To do this, remove plug.

Loosen fastening screw of idler gear (4) and pivot eccentric to the right until timing chain is relaxed.

Remove timing chain.

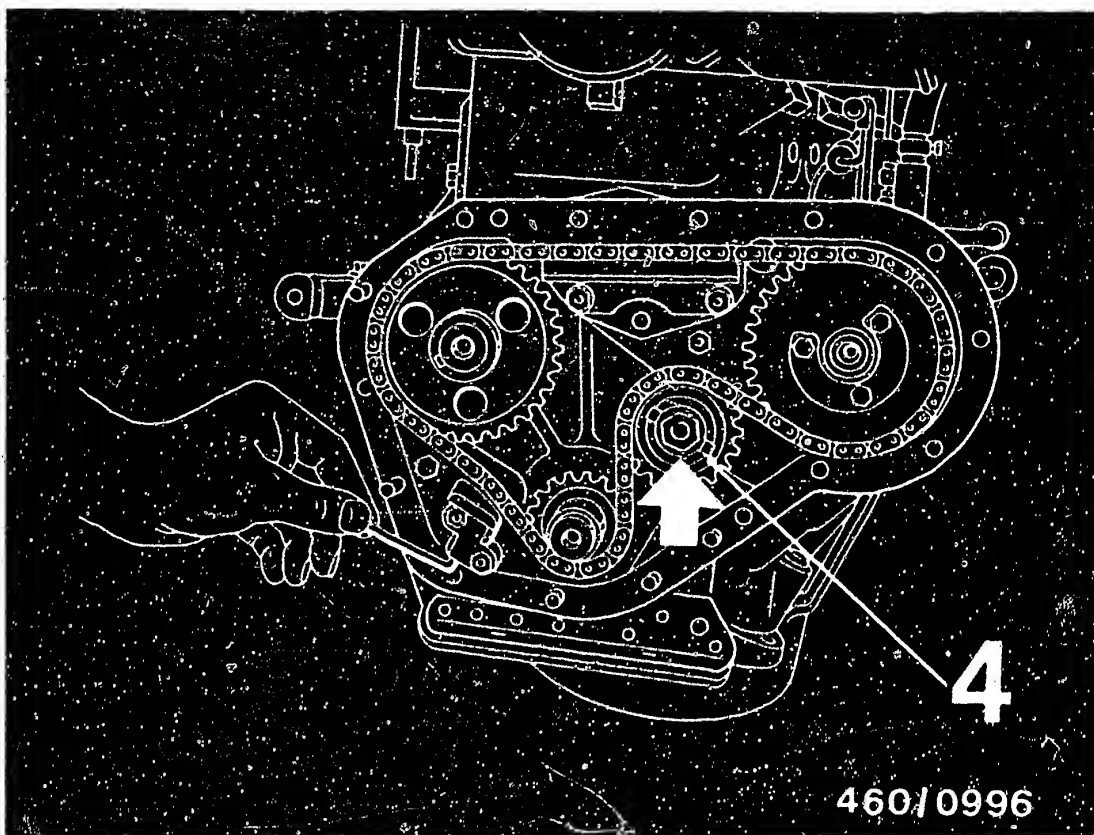
Bring crankshaft gear (1), camshaft gear (2) and injection-pump gear (3) into the correct position with respect to the marks (arrows), see picture.



Place timing chain on crankshaft gear (1) so that copper link is against punch mark (arrow).

When placing the timing chain on the other gears, make sure that line marks on timing chain and gear are in alignment (arrows).



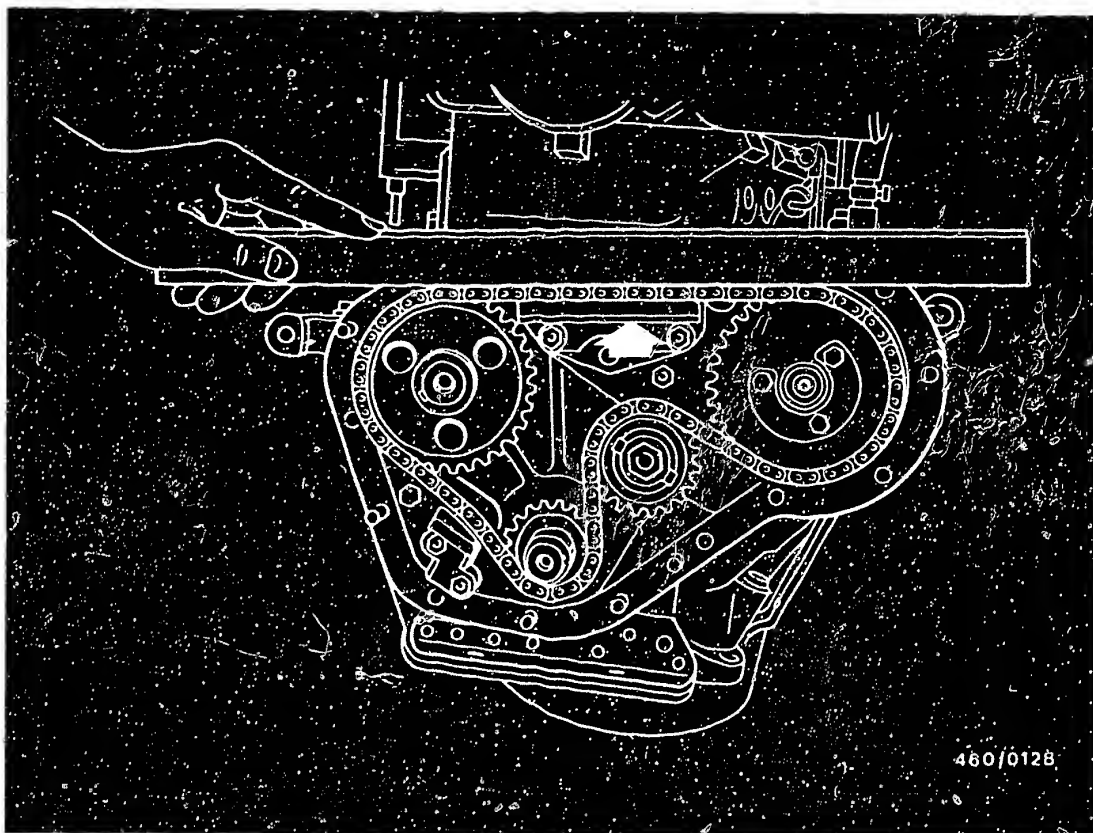


Pivot the intermediate gear (4) to the left counter to the direction of engine rotation until there is a gap of from 0.5...1.0 mm between the shoe of the chain tensioner and its bracket.

Tighten the fastening screw for the intermediate gear (arrow) to 50 Nm.

Prestress the spring on the chain tensioner using a hexagon-socket-screw key until the control chain lies up tight against the shoe.

Put the screw plug on the chain tensioner.



Lay rule over camshaft gear and pump gear.

Bring guide shoe (arrow) up against timing chain and tighten fastening screws.

If still mounted, remove hexagon screw from crankshaft gear.

Mount timing cover.

Install crankshaft pulley and fan wheel with V-belt.

Newer models of engine have no shoe (arrow).
After re-adjusting the engine timing, check the injection-timing and if need be adjust it.



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3. Rapid diagnostic chart	E 9
4. Electrical safety circuit	E 16
5. Diagram of fuel lines	E 19
6. General safety instructions	E 21
7. Installation position of the components	E 22



1. Special features:

The structure and operation of the version KE 1 of the K-Jetronic system in the Ford Escort RS 1600 T corresponds to that of the basic model. See the description in the Technical Bulletin VDT-I-438/3 De.

Scope of operation of the electronically controlled corrections:

- Warm-up enrichment
- Starting enrichment
- Post-start enrichment
- Acceleration enrichment
- Full-load enrichment
- Overrun cutoff

Special features of the engine:

- Exhaust gas turbocharger

Basic microfiche card for detailed trouble-shooting:
MB 501.

Important note:

When referring to a basic microfiche card, bear in mind that the test specifications must always be obtained from the brief instructions specific to the given vehicle.



2. Test specifications

<u>Test step</u>	<u>Test specifications*</u>
------------------	-----------------------------

2.1 Electric fuel pump:

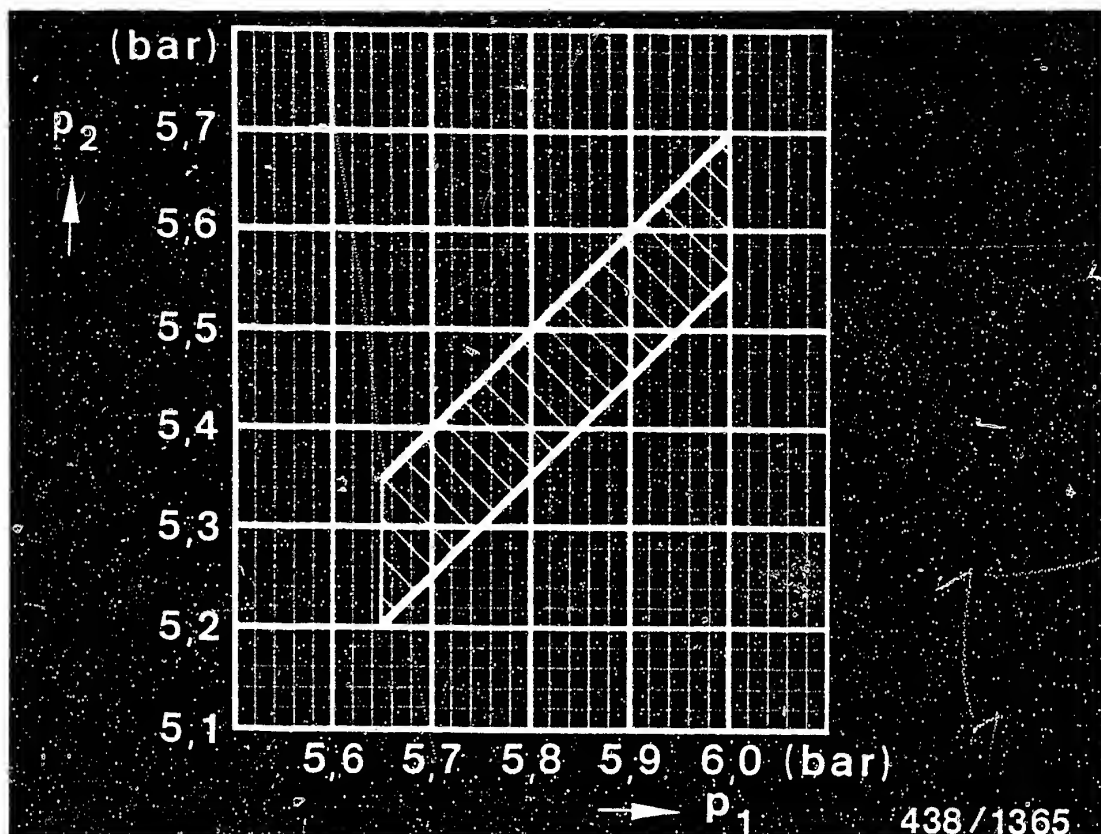
Fuel delivery	min. 1100 cm ³ /min.
---------------	---------------------------------

2.2 Fuel pressures:

Primary pressure	5.65...6.0 bar (5.75...6.1 kgf/cm ²)
------------------	---

* Pressures indicated in test specifications in bar (gauge pressure) or in kgf/cm² (gauge pressure).





p_1 = Primary pressure

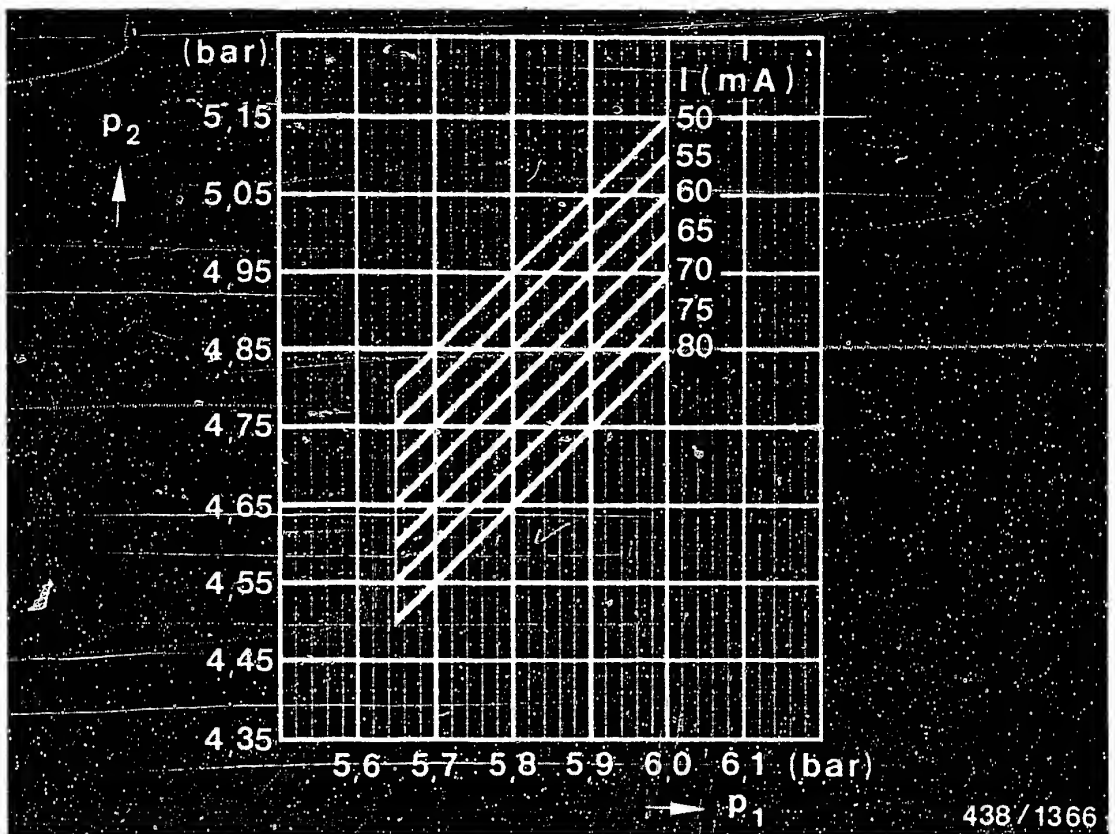
p_2 = Lower chamber pressure, actuator current = 0 mA

Differential pressure:

(Primary pressure/lower chamber pressure)

Obtain the specified value for the "warm" lower chamber pressure from the diagram in accordance with the primary pressure as measured.

The "warm" condition is simulated by disconnecting the plug for the lead on the pressure actuator (actuator current 0 mA).



p_1 = Primary pressure

p_2 = "Cold" lower chamber pressure. Tolerance ± 0.15 bar

I = Actuator current

Obtain the specified value for "cold" lower chamber pressure from the diagram in accordance with the primary pressure as measured and the actuator current as measured.

The "cold" condition is simulated by disconnecting the plug for the lead on the temperature sensor (NTC). Connect the plug for the lead on the pressure actuator.

E5

Test specifications

Ford Escort RS 1600 T



<u>Test step</u>	<u>Test specifications*</u>
------------------	-----------------------------

2.3 Testing the fuel system as a whole for leaks:

Min. pressure after 10 min:	2.7 bar (2.8 kgf/cm ²)
after 20 min:	2.6 bar (2.7 kgf/cm ²)

2.4 Fuel-injection valves:

Opening pressure	3.0...4.1 bar (3.1...4.2 kgf/cm ²)
------------------	---

2.5 Checking the fuel distributor:

(Testing with pressure actuator attached.
No current in pressure actuator.)

Comparative measurement of fuel deliveries from outlets:	Setting	Max. allowable fuel delivery
Idle:	6.0 cm ³ /min	6.6 cm ³ /min
Part load:	40.0 cm ³ /min	42.5 cm ³ /min
Full load:	155.0 cm ³ /min	169.0 cm ³ /min

The full-load delivery for the setting point must be attained at a minimum at every outlet with maximum deflection of the air-flow sensor plate.

Flow through the KE-choke in the fuel distributor:	130...145 cm ³ /min.
---	---------------------------------

* Pressures indicated in test specifications in bar (gauge pressure) or in kgf/cm² (gauge pressure).



Test stepTest specifications2.6 Temperature sensor

Measurements of resistance:

Engine cold. Ambient
temperature (+15°C...+30°C): 1300...3600 Ω

Engine at normal operating
temperature (approx. +80°C): 250...390 Ω

2.7 Thermotime switch

Measurements of resistance:

at a temperature	Measurement of resistance between		
	Term. "G" and ground (housing)	Term. "W" and ground (housing)	Term. "G" and Term. "W"
less than +30°C	25...40 Ω	0 Ω	25...40Ω
above + 40°C	50...80 Ω	100...160 Ω	50...80Ω

2.8 Air-flow sensor - Potentiometer:

Voltage signal with
air-flow sensor plate
in basic setting: 0.2...0.3 V

2.9 Auxiliary-air device:

Resistance of the heating
coil: 30 ... 65 Ω



<u>Test step</u>	<u>Test specifications</u>
<u>2.10 Idle adjustment:</u>	
Idle speed:	700...800 min ⁻¹
Idle exhaust value (CO):	0.2...0.8 vol.%



3. Rapid diagnostic chart for the Universal Test Adapter ETT 018.01 with the KE-Jetronic test lead 1 684 463 135 and a suitable multimeter:

The rapid diagnostic chart below makes it possible for the experienced Jetronic expert to check quickly the electrical/electronic peripheral and control unit operations of the KE-Jetronic.





Important instructions for the rapid diagnostic chart below:

The column "test conditions" shows those test steps at which the control unit plug must be connected and/or disconnected.

Make absolutely certain that the ignition is switched off every time the plug is plugged in or disconnected!



Rapid diagnostic chart for the Universal Test Adapter ETT 018.01

<u>Test step</u>	<u>Switch setting</u>		<u>Button</u>	<u>Object tested</u>	<u>Test connections</u>	<u>Test conditions</u>	<u>Test specifications (Reading)</u>
	V	Ω					
1		4	-	Pressure actuator Internal re- sistance	12 - 10	Disconnect control unit plug.	21 ... 30 Ω
2		5	-	Temperature sensor Internal re- sistance +15...+30°C approx. +80°C	21 - 2	Control unit plug disconnected.	1.3...3.6 k Ω 250...390 Ω
3		9	-	"Idle" throttle valve switch	13 - 6	Control unit plug disconnected. Throttle valve closed. Open throttle valve by hand	0 ... 10 Ω ∞ Ω
4		10	-	"Full load" Throttle valve switch	5 - 6	Control unit plug disconnected. Throttle valve closed. Throttle valve fully open.	∞ Ω 0 ... 10 Ω
5	4	-	-	Starting signal	24 - 2	Control unit plug disconnected. Activate starting motor.	8 ... 15 V
6	5	-	-	TD signal	25 - 2	Control unit plug disconnected. Activate starting motor for a few seconds.	V undefined.
7	6	-	-	Control unit Power supply	1 - 2	Control unit plug disconnected. Switch on ignition.	8 ... 15 V
8	7	-	-	Air-flow sensor potentiometer power supply	18 - 2	Switch off ignition. Connect control unit. Switch on ignition.	7.0 ... 8.0 V

E10

Rapid diag.chart f.Universal Test Adapter
Ford Escort RS 1600 T



E11

Rapid diag.chart f.Universal Test Adapter
Ford Escort RS 1600 T



Rapid diagnostic chart for the Universal Test Adapter ETT 018.01 (continued)

Test step	Switch setting		Button	Object tested	Test connections	Test conditions	Test specifications
	V	Ω					(Reading)
9	8	-	-	Air-flow sensor potentiometer signal	17 - 2	Control unit connected. Switch on ignition. Deflect air-flow sensor flap by hand. Voltage rises from 0 to max. 8.0 V	0 ... 8.0 V
10	9	-	-	Throttle-valve switch - power supply	6 - 2	Control unit connected. Switch on ignition.	7.0 ... 8.0 V
11	-	-	1	Warm-up enrichment, -20°C	12 - 12	Control unit connected. Switch on ignition.	30 ... 50 mA
12	-	-	2	Actuator current, corresponding to engine at normal operating temp.	12 - 12	Control unit connected. Switch on ignition.	0 ... 1 mA
13	-	-	2/4	Starting enrichment	12 - 12	Control unit connected. Switch on ignition. Continue pressing button 2. Triggering of starting enrichment (regardless of temperature) at beginning of start-up (TA 4). Switched off after approx. 1 sec.	110 ... 130mA
14	-	-	1/4	Post-start enrichment	12 - 12	Control unit connected. Switch on ignition. Continue pressing button 1. Triggering of post-start enrichment (dependent on temperature) at end of start-up (TA 4). Then slow cutback to warm-up value in test step 11. (30 ... 50 mA)	140 ... 160mA

E12

Rapid diag.chart f.Universal Test Adapter
Ford Escort RS 1600 T



E13

Rapid diag.chart f.Universal Test Adapter
Ford Escort RS 1600 T



Rapid diagnostic chart for the Universal Test Adapter ETT 018.01 (continued)

<u>Test step</u>	<u>Switch setting</u>		<u>Button</u>	<u>Object tested</u>	<u>Test connections</u>	<u>Test conditions</u>	<u>Test specifications</u>
	V	Ω					(Reading)
15	-	-	1/6	Acceleration enrichment	12 - 12	Control unit connected. Switch on ignition. Continue pressing both buttons. Value for current corresponding to test specification in test step 11 (30...50 mA). Then deflect the air-flow sensor plate. Reading for current rises to test specification and cuts back very rapidly again (approx. 1 second).	80...120 mA
16	-	-	6	Full-load enrichment	12 - 12	Control unit connected. Switch on ignition:	7 ... 9 mA
17	-	-	2	Overrun cutoff	12 - 12	Control unit connected. Start the engine. Reverse the terminals on the ammeter (exchange positive and negative.) Increase engine speed to approx. 2000 min ⁻¹ while pressing on buttons. Then close the throttle valve. Reading for current goes to the test specification and switches at approx. 1500 min ⁻¹ to 0 ... 1 mA	> - 40 mA

E14

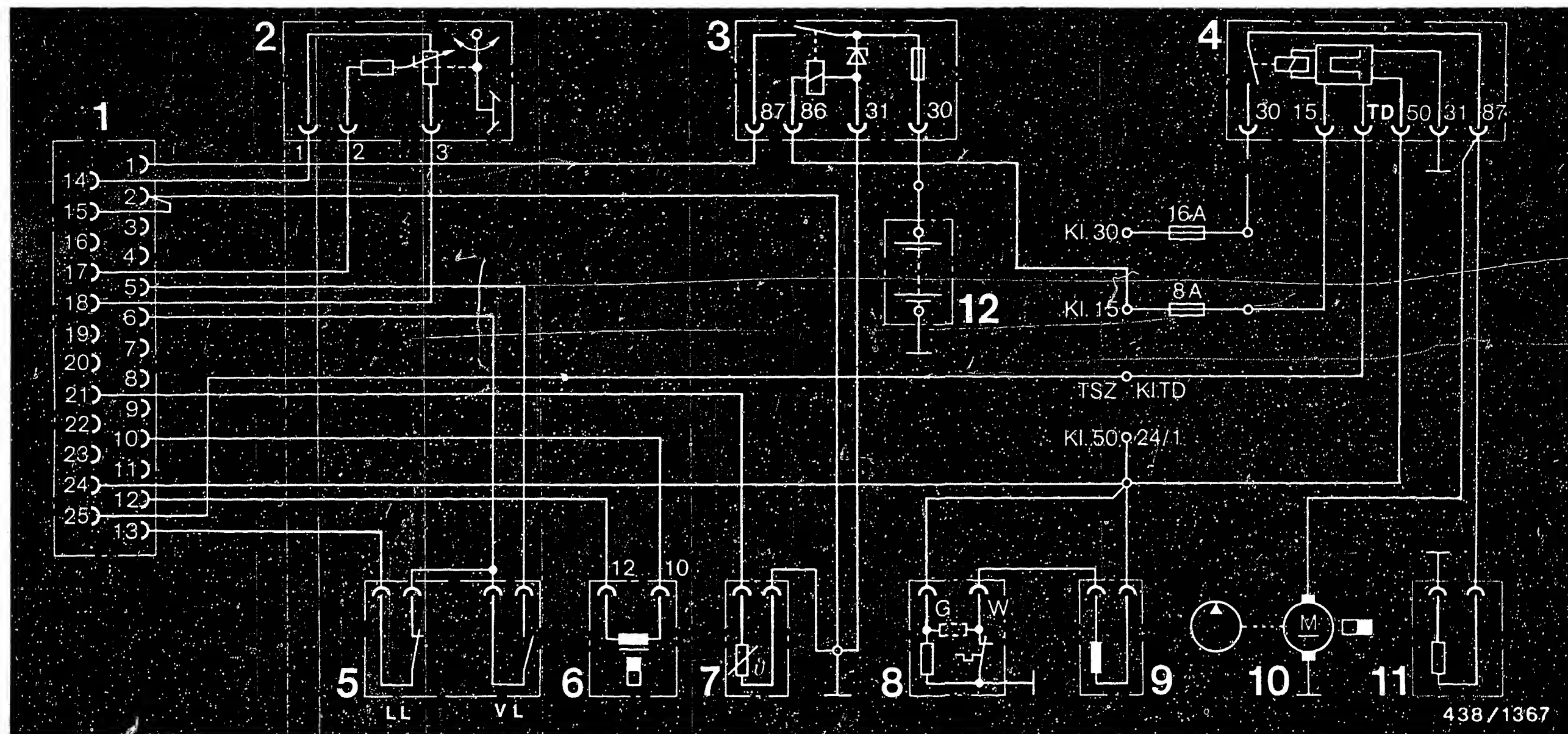
Rapid diag.chart f.Universal Test Adapter
Ford Escort RS 1600 T



E15

Rapid diag.chart f.Universal Test Adapter
Ford Escort RS 1600 T





4. Electrical safety circuit

4.1 Electrical connection diagram for the KE-Jetronic

- | | | |
|--|---|---------------------------|
| 1 = Electronic control unit | 5 = Idle, full load throttle valve switches | 9 = Start valve |
| 2 = Air-flow sensor-Potentiometer | 6 = Electrohydraulic pressure actuator | 10 = Electric fuel pump |
| 3 = Electronic relay with over-voltage protection | 7 = Temperature sensor (NTC) | 11 = Auxiliary-air device |
| 4 = Engine speed relay for safety circuit (pump relay) | 8 = Thermotime switch | 12 = Battery |
| | | Kl. = Term. |

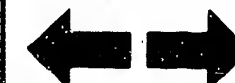
E16

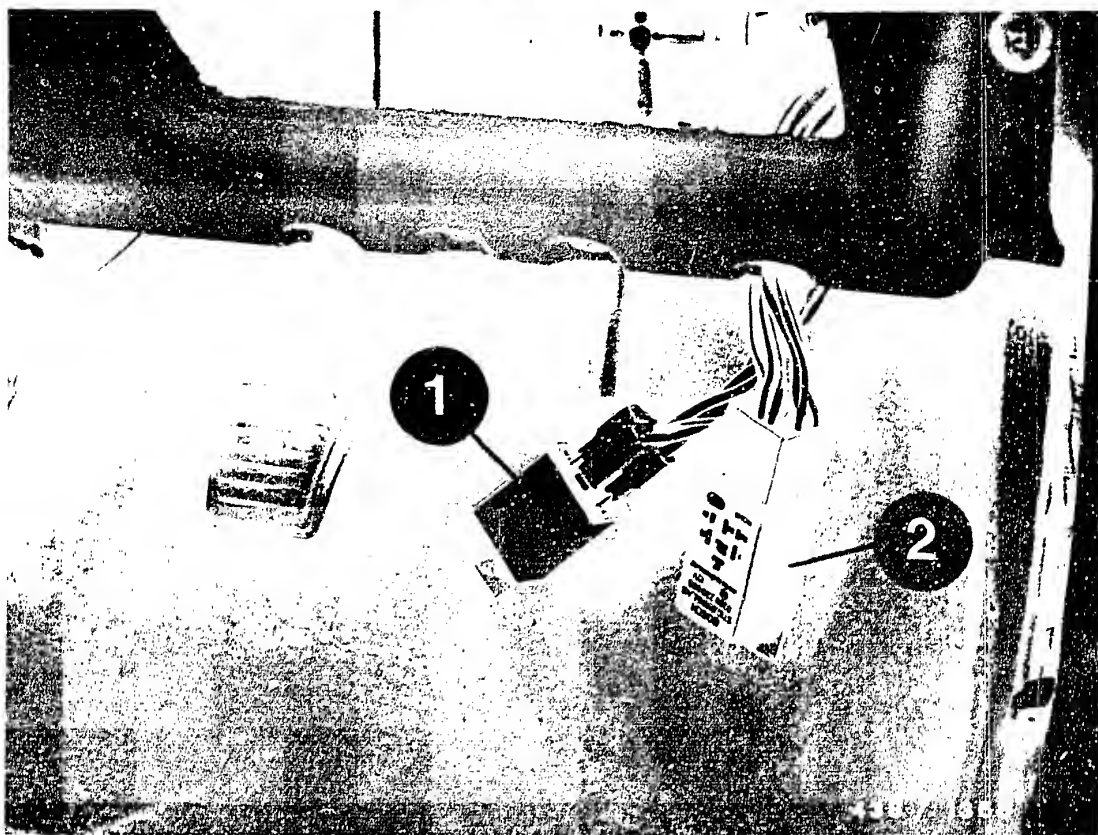
Electrical connection diagram
Ford Escort RS 1600 T



E17

Electrical connection diagram
Ford Escort RS 1600 T





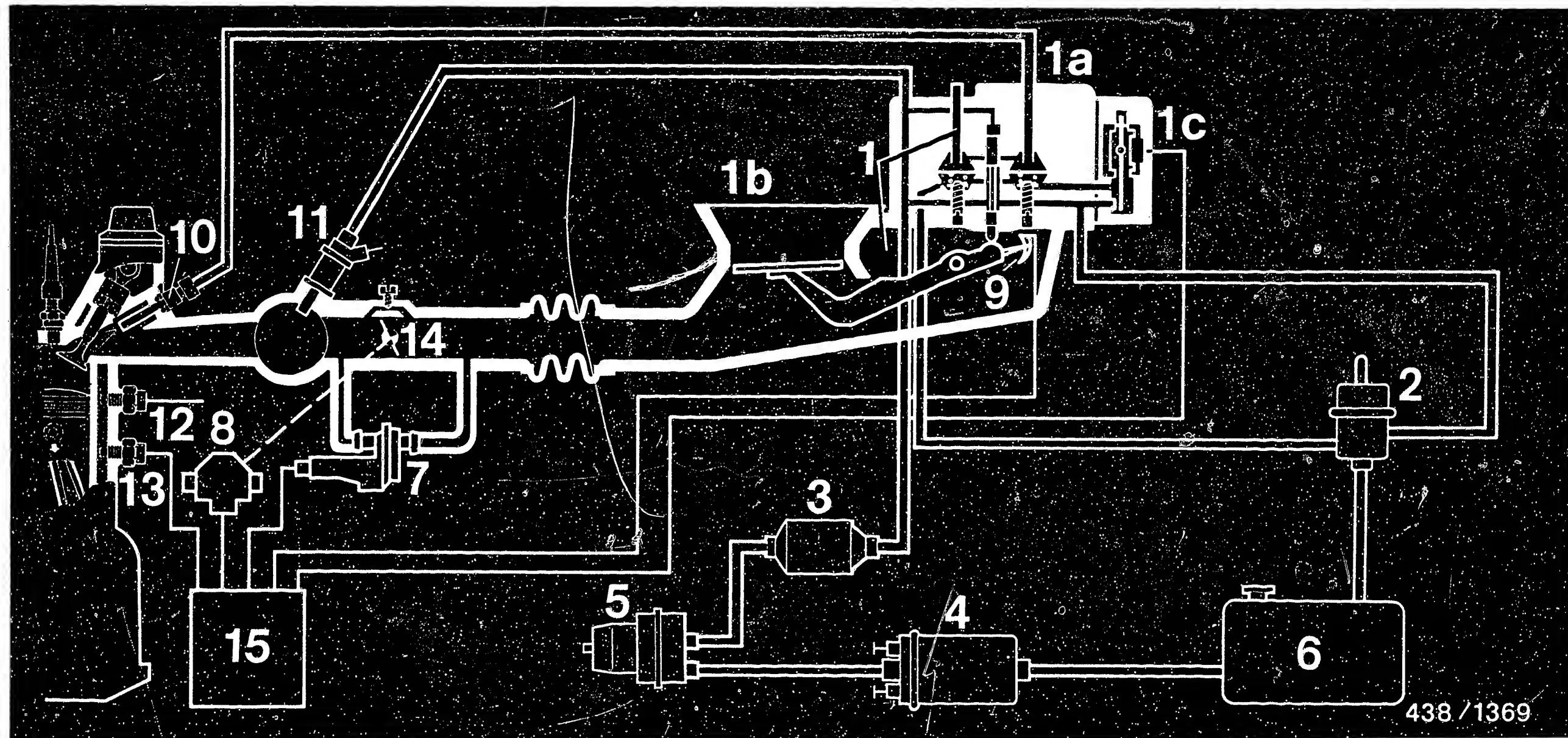
- 1 = Electronic relay with over-voltage protection
2 = Engine speed relay (pump relay)

4.2 Jumping the electrical safety circuit:

The jump is made (for all measurements of pressure and fuel delivery) at the relay socket for the engine speed relay.

The engine speed relay and the over-voltage protection relay are located behind the dashboard, on the right side of the vehicle. (Photograph taken in a right-hand drive vehicle.)





5. Diagram of fuel lines, KE-Jetronic

- | | | |
|---|--|-----------------------------------|
| 1 = Mixture-control unit | 3 = Fuel filter | 9 = Air-flow sensor potentiometer |
| 1a = Fuel distributor | 4 = Electric fuel pump | 10 = Fuel-injection valve |
| 1b = Air-flow sensor | 5 = Fuel accumulator | 11 = Start valve |
| 1c = Electrohydraulic pressure actuator | 6 = Fuel tank | 12 = Thermotime switch |
| 2 = Pressure regulator (primary pressure) | 7 = Auxiliary-air device | 13 = Temperature sensor (NTC) |
| | 8 = Full-load/idle throttle valve switches | 14 = Throttle valve |
| | | 15 = Control unit |

E19

Diagram of fuel lines
Ford Escort RS 1600 T



E20

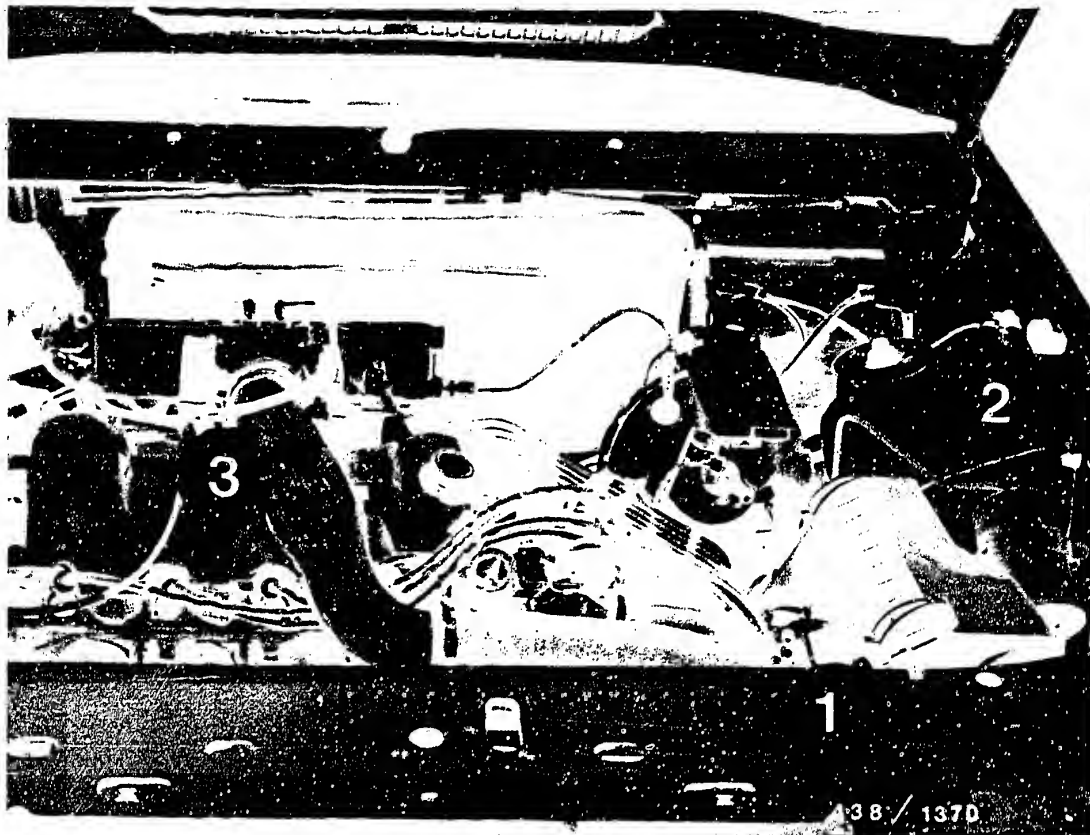
Diagram of fuel lines
Ford Escort RS 1600 T



6. General safety instructions for working on vehicles with the KE-Jetronic

- When testing with the electric fuel pump running, never deflect the sensor plate in the air-flow sensor (press it down), because that causes fuel to be injected via the fuel-injection valves. In a subsequent starting of the engine, that can cause extremely serious engine damage.
- When testing the fuel-injection valves with the valve tester, follow the specifications for testing medium.
Never run the test with driving gasoline or other highly flammable fluids.
Even when using test gasoline, follow local safety regulations.
- Use only a permitted leak detector spray (e.g. Gypoflex) when testing the engine intake system for leaks. Do not use any highly flammable fluids. Follow local safety regulations.
- Never start the engine without the battery being firmly connected.
- Never disconnect the battery from the vehicle electrical system while the engine is running.
- When quick-charging the battery, disconnect it from the vehicle electrical system.
- Remove the KE-Jetronic control unit at temperatures above +80°C (paint-drying ovens).
- Remove the KE-Jetronic control unit during electric welding jobs (e.g., spot welding).
- Make certain all wiring harness plugs are properly seated.
- Never disconnect or connect wiring harness plugs for the control unit while the ignition is switched on.





7. Installation position of the individual components

7.1 Arrangement of the components in the engine area:

- 1 - Mixture-control unit, primary pressure regulator, under the air filter housing.
- 2 - Fuel filter, on the inside fender on the left, behind the air filter.
- 3 - Throttle valve switch, on the throttle-valve assembly.

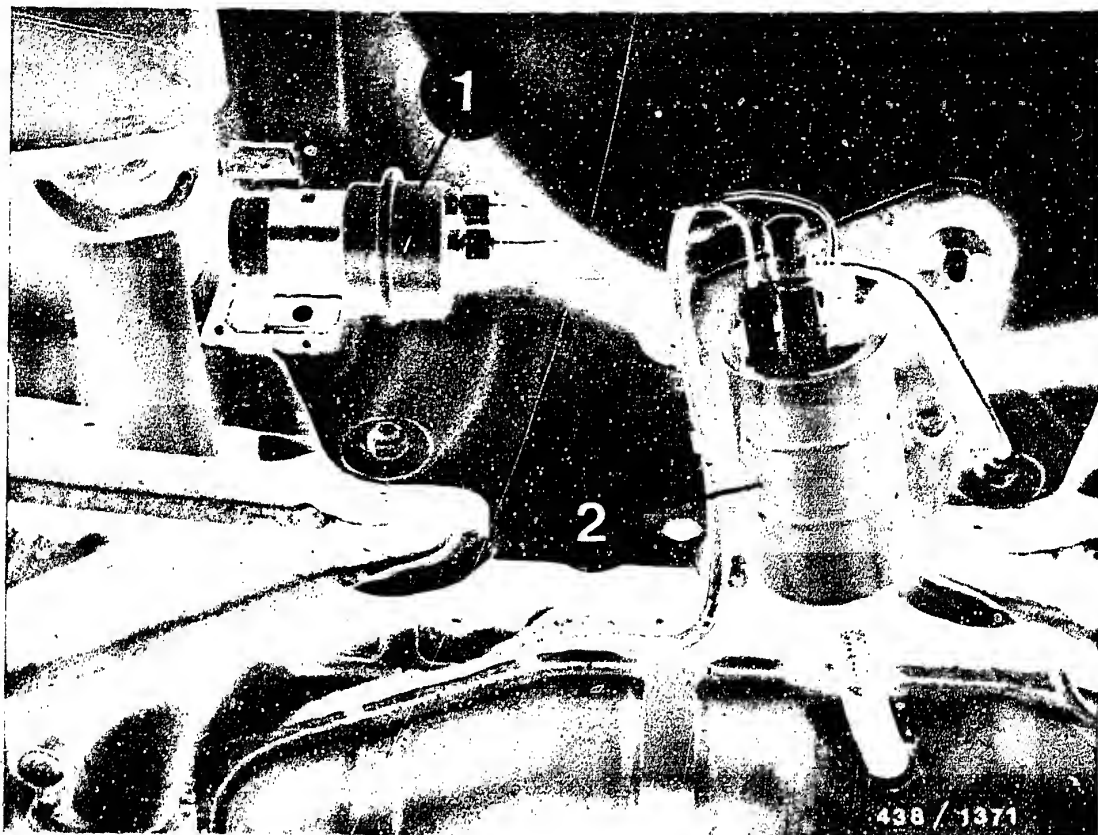
Fuel-injection valves, in the flanges of the individual intake tubes.

Auxiliary-air device, on the intake manifold.

Thermotime switch, temperature sensor (NTC), beneath intake manifold flanges 2 and 3 (accessible from under the vehicle).

Control unit, on the engine bulkhead, behind the heater housing.





- 1 = Fuel accumulator
- 2 = Electric fuel pump

7.2 Components of the fuel supply system:

The electric fuel pump and the fuel accumulator are located on the lower side of the vehicle, in the area above the rear axle.



Table of contents

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Coordinates

1. Special features.....	F	2
2. Rapid diagnosis chart.....	F	2
3. General information.....	F	5
4. Circuit diagram of electrical headlight vertical aim control.....	F	7
5. Test equipment.....	F	8
6. Testing and repair.....	F	9



1. Special features

Microcard for testing and repairing the electric headlight vertical aim control (LWR) installed in the Ford Scorpio (France version) as of the introduction of this vehicle (late 1984)

2. Rapid diagnosis chart for headlight vertical aim control (LWR)

The following rapid diagnosis chart makes it possible for the experienced specialist to test the LWR system using the headlight aiming device 0 681 130 .. or 0 684 100 .. .

The contents of this list are restricted to the following information:

- Test step sequence
- Setting instructions and test specifications (headlight aiming device reading values)
- Reference to the coordinates of respective detailed testing and trouble-shooting programs.

If detailed information and references are necessary, proceed per testing and adjustment information starting with Coordinate F 10.

Prerequisites for testing

- Tire pressure correct
- Vehicle ready to drive (full tank) and unloaded except for 75 kg (driver) (per EEC guideline 76/756)
- Lower beams on
- Headlight aiming device set up per operating instructions.

Testing and adjusting must always be carried out for both headlights.



Rapid diagnosis chart for testing with headlight aiming device 0 681 130 ... or 0 684 100 ...

Always carry out testing with both headlights!

Test step	Set headlight vertical aim adj. dev. in vehicle to:	Set headlight aiming device to:	Set headlights to:	Reading on headlight aiming device	Coordinates
1	Position "0" (basic position)	12 cm inclination	Cutoff		
2	Position "5"	Cutoff		≥ 53 cm	
3	Position "0" (basic position)	12 cm inclination	Cutoff		

F3

Rapid diagnosis chart

Ford, headl. vert. aim contr.



F4

Rapid diagnosis chart

Ford, headl. vert. aim contr.



3. General information

The manual adjustment device for the electric headlight vertical aim control (LWR system 0 132 008 ..) is located on the left in the dashboard. In test step 1, basic setting of the headlights is carried out.

Note: Basic setting is with reference to EEC setting regulations.
In countries outside the EEC, observe local regulations.

F5

General information

Ford, headl. vert. aim contr.



Operation:

Depending on the loading of the vehicle, the position of the headlamp reflectors can be adjusted (infinitely variable) within the prescribed angle of inclination via a manual control, while the lamps are on.

The manual control has two stops:

Position "0": basic position

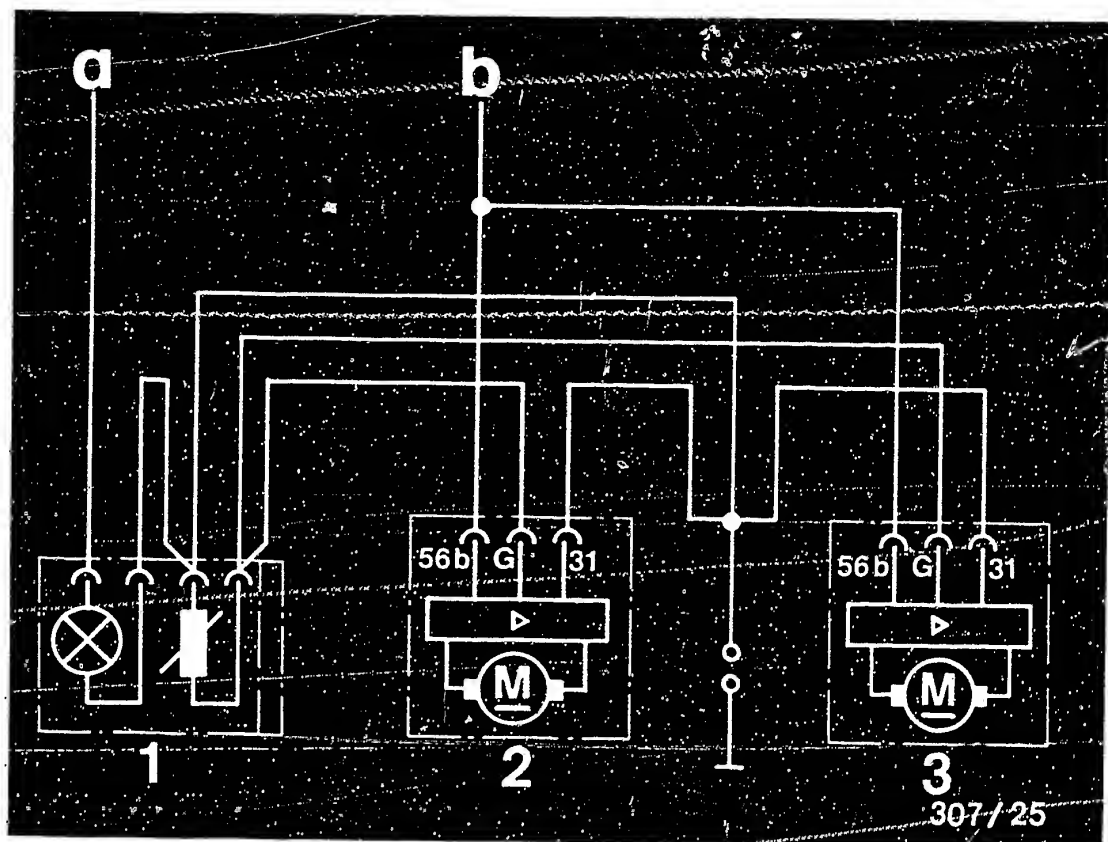
Position "5": maximum angle of inclination

In the manual control, the displacement of an iron core in a coil sets a frequency (nominal value). By the same principle, the actuator sets a frequency (actual value) which depends on the position of the adjusting spindle.

The switching electronics built into the actuator compare the nominal value with the actual value.

Depending on the difference in frequency, the reflectors are moved upwards or downwards.





- 1 = Headlight vertical aim adjusting device with thumbwheel
 2 = Control motor with actuator, left
 3 = Control motor with actuator, right

- a = To brightness regulator for instrument illumination
 b = To fuse term. 56 B and bulb-failure indicator

4. Circuit diagram for electric headlight vertical aim control in Ford Scorpio (France version)

F7

Circuit diagram

Ford, headl. vert. aim contr.



5. Test equipment

Headlight aiming device

0 681 130 ...

or

Headlight aiming device

0 684 100 ...

Voltmeter/ohmmeter

e.g. Electric-Tester

ETE 014.00

0 684 101 400

or

Multimeter

commercially
available

F8

Test equipment

Ford, headl. vert. aim contr.



6. Testing and repair

Prerequisites for testing the LWR system:

- Tire pressure correct
- Vehicle ready to drive (full tank) and unloaded except for 75 kg (driver) (per EEC guideline 76/756)
- Lower beams on
- Headlight aiming device set up per operating instructions
- Battery voltage > 10 V

Testing and adjusting must always be carried out for both headlights

Note

For detailed testing and trouble-shooting, carry out the test steps sequentially starting with Coordinate F 10.

Continue with the trouble-shooting given under the test steps only when a fault is found.



Test step 1:

Test subject:

Basic headlight setting

Measuring equipment:

Headlight aiming device

0 681 130 ...

0 684 100 ...

Headlight aiming device setting:

12 cm inclination

Operation in vehicle:

Turn manual control (upper illustration) to position "0" (basic setting).

Test specification (reading):

Cutoff to headlight aiming device (12 cm inclination)

Is cutoff correctly set?

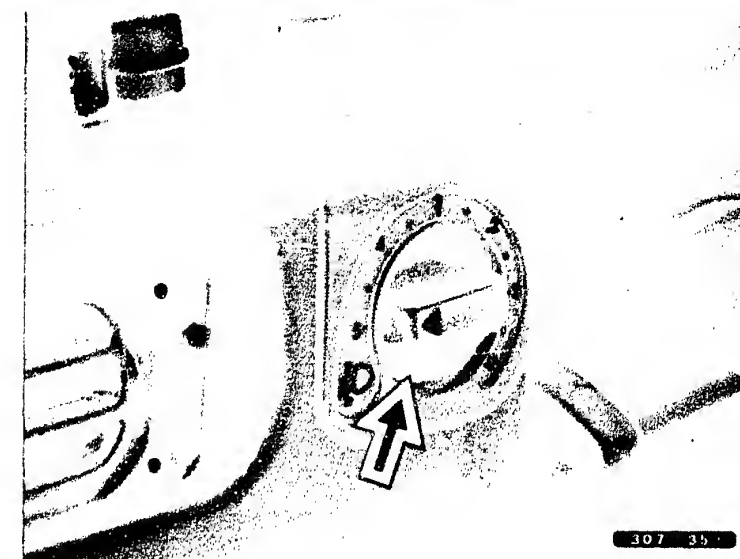
no

Trouble-shooting:

Correctly adjust headlights to cutoff at adjusting screw (lower illustration).

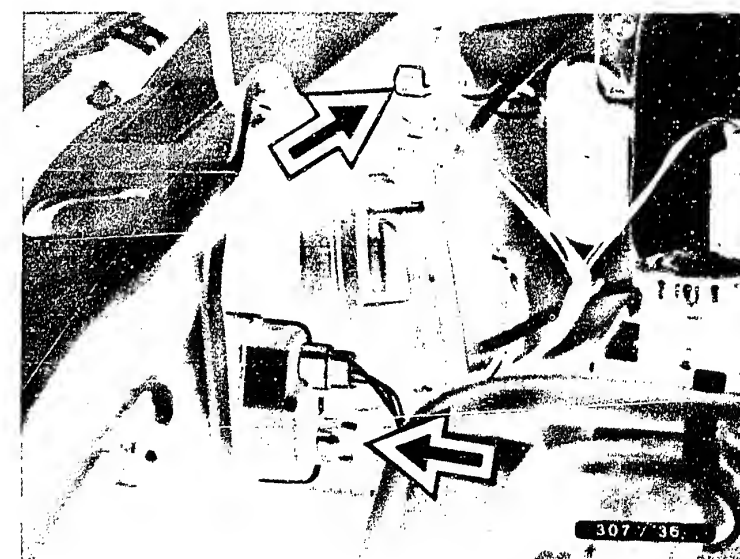
If headlights are not mechanically adjustable:

Check headlights and actuators for damage and replace if necessary.



1 = Manual control

2 = Adjustment screw for headlight basic setting



yes

Continued on next page

F10

Testing and repair

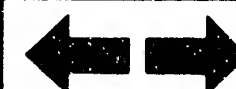
Ford, headl. vert. aim contr.



F11

Testing and repair

Ford, headl. vert. aim contr.



Test step 2:

Test subject:

LWR system, downwards adjustment

Measuring equipment:

Headlight aiming device

0 681 130 .. (upper illustration)

0 684 100 .. (lower illustration)

Operation in vehicle:

Turn manual control to "5".

Headlight aiming device setting:

Set to cutoff.

Test specifications (reading)

Cutoff lies at ≥ 53 cm inclination.
(Read off on headlight aiming device adjustment scale)

Is test specification reached?

yes

Continued on next page

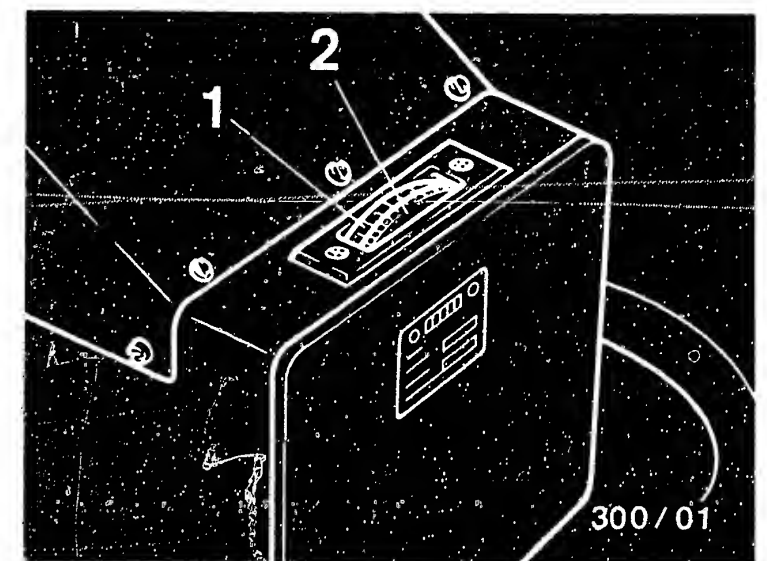
no

Trouble-shooting:

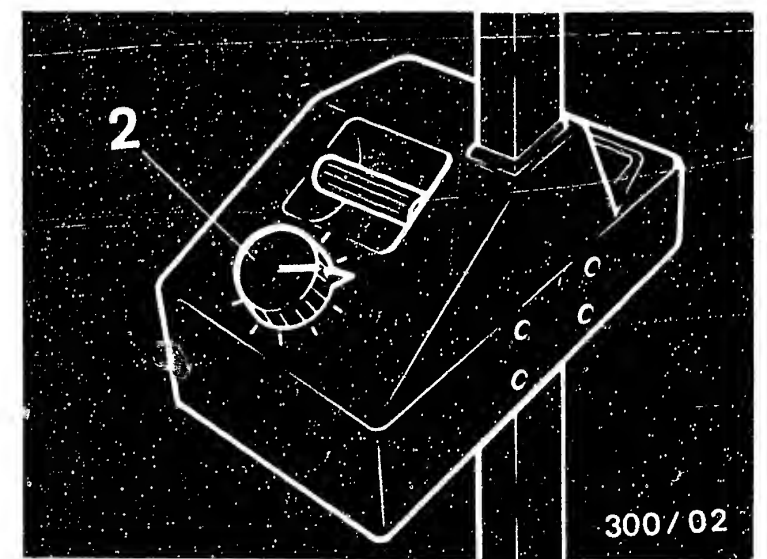
Headlight adjustment only partially reached:

Check headlights for freedom of movement.

Check adjustment travel of actuators.



1 = Adjustment scale
2 = knurled thumbscrew or rotary knob for adjusting inclination



Continued on next page

F12

Testing and repair

Ford, headl. vert. aim contr.



F13

Testing and repair

Ford, headl. vert. aim contr.



Trouble-shooting test step 2: (continued):

yes

Check voltage supply at actuators (see lower illustration):

Pull plug at actuator.

Using voltmeter, check at actuator plug (center illustration) term. 56b to ground (term. 31):

Nominal reading: > 10 V

(Ignition and lower beams on)

Is test specification reached?

yes

Test manual adjustment device (see upper illustration)

Using voltmeter, check at actuator plug (center illustration) term. G to ground (term. 31):

Nominal reading: approx. 110 Ω

Is test specification reached?

yes

Continued on next page

no

Check fuse term. 56.

Using ohmmeter, check lead from actuator plug term. 56b to central electrics console and term. 51 to ground, for short circuit and open circuit.

Elimination of defect:
Eliminate short circuits and open circuits in leads.

Using ohmmeter, check lead from actuator plug to term. G (see center illustration) to manual control plug for open circuit:

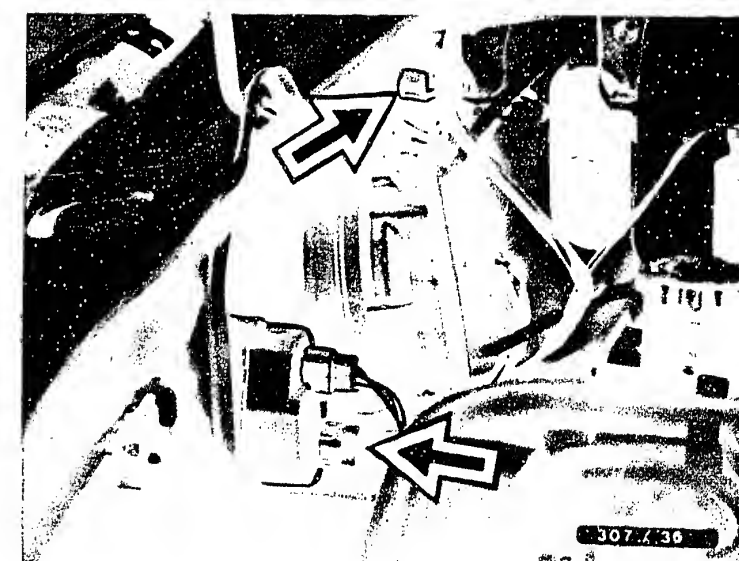
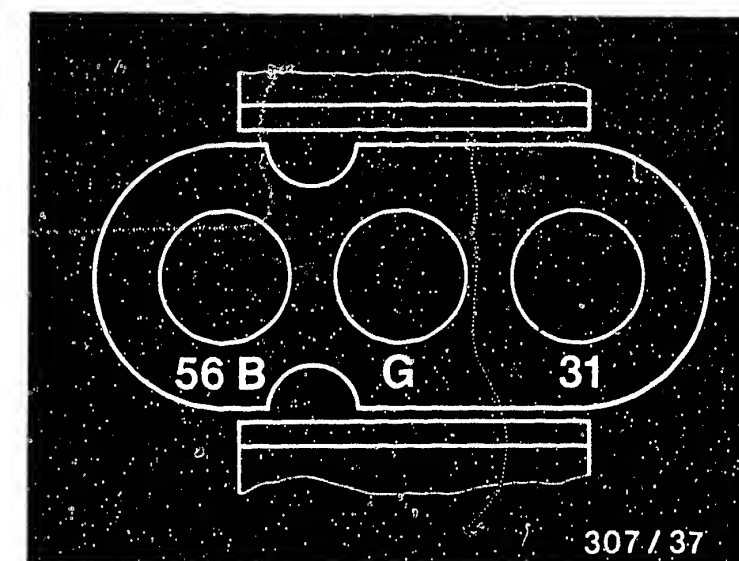
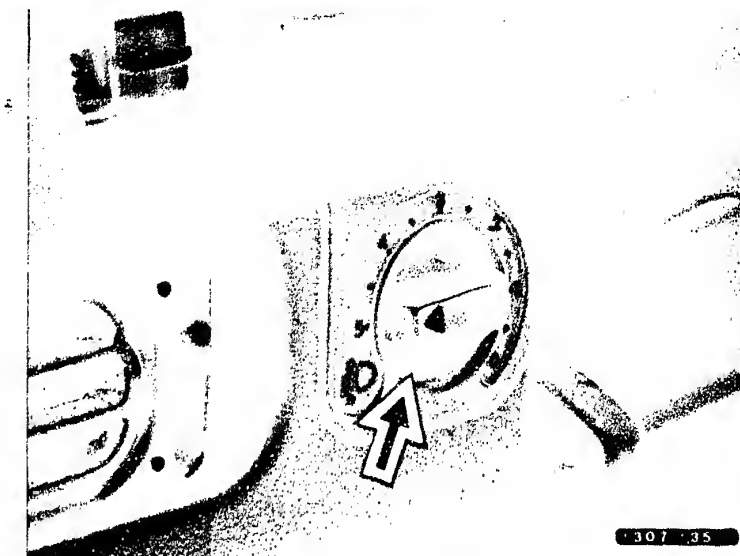
Nominal reading: approx. 0 Ω

Using ohmmeter, check directly between manual control plug pins (see upper illustration):

Reading: approx. 110 Ω

Elimination of defect:
Eliminate open circuit in control lead.
Replace manual control.

no



F14

Testing and repair

Ford, headl. vert. aim contr.



F15

Testing and repair

Ford, headl. vert. aim contr.



yes

Test operation of actuators:
Operate system with individual actuators one by one.

Are both actuators functioning?

yes

Check adjustment travel of adjusting spindle:
Remove both actuators. To remove and install actuators, remove headlamps!

Note: When installing headlamps, make sure of correct gap between headlamp and hood. Incorrectly-installed headlamps cause wind noise.

Remove actuators by turning out of bayonet catch. Use suitable wire eye to lift catch in snap socket (see upper illustration) and pull actuator out of snap socket.

Connect both plugs to actuators.
Switch on ignition and lower beams.
Manual control in "0" position (basic position).

Use caliper to measure projection of actuating spindle (see lower illustration). Turn manual control to "5" position and again measure projection of actuating spindle. The difference between the two measurements must be at least 4.5 mm. If not, replace actuator.

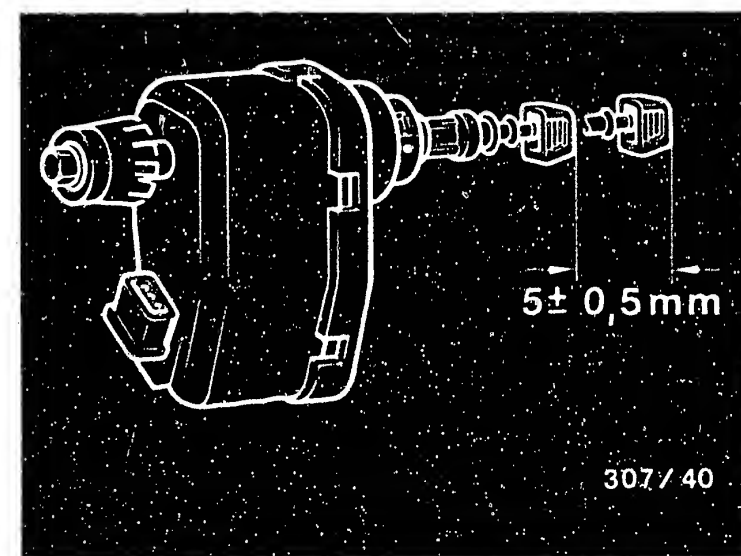
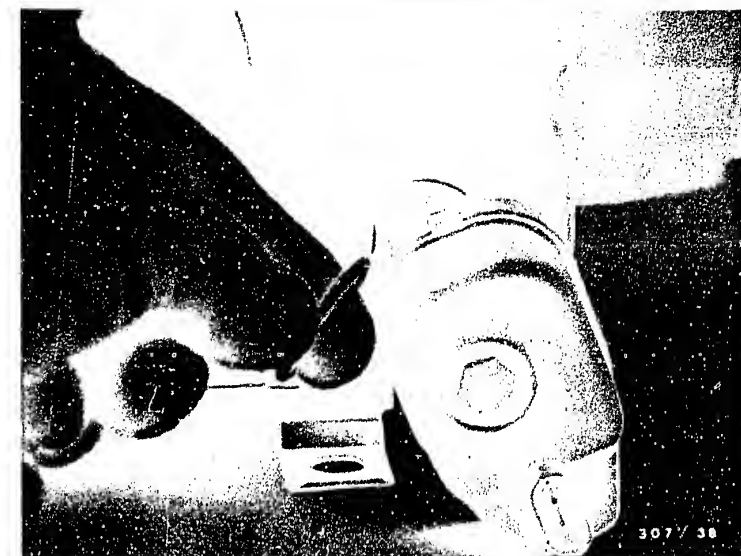
no

Replace defective actuator. To remove and install actuators, remove headlamps!

Note:

When installing headlamps, make sure of correct gap between headlamp and hood. Incorrectly-installed headlamps cause wind noise.

Turn actuator out of bayonet catch. Using suitable wire eye, lift catch in snap socket (see upper illustration) and pull actuator out of socket. To insert new actuator, hold reflector firmly and push actuator into snap socket. Then turn actuator back into bayonet catch.



F16

Testing and repair

Ford, headl. vert. aim contr.



F17

Testing and repair

Ford, headl. vert. aim contr.



Test step 3:

Test subject:

LWR system, basic setting

Measuring equipment:

Headlight aiming device

0 681 130 ..

0 684 100 ..

Operation in vehicle:

Turn thumbwheel (see upper illustration) to position "0" (basic setting).

Headlight aiming device setting:

Set to cutoff

Test specification (reading):

Cutoff lies at 12 cm inclination.
(Read off of adjustment scale of headlight aiming device)

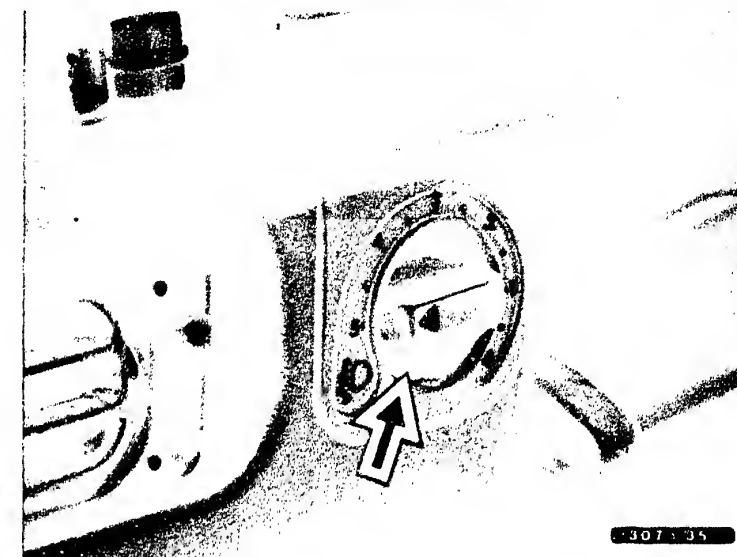
Is cutoff at 12 cm inclination?

yes

Testing completed

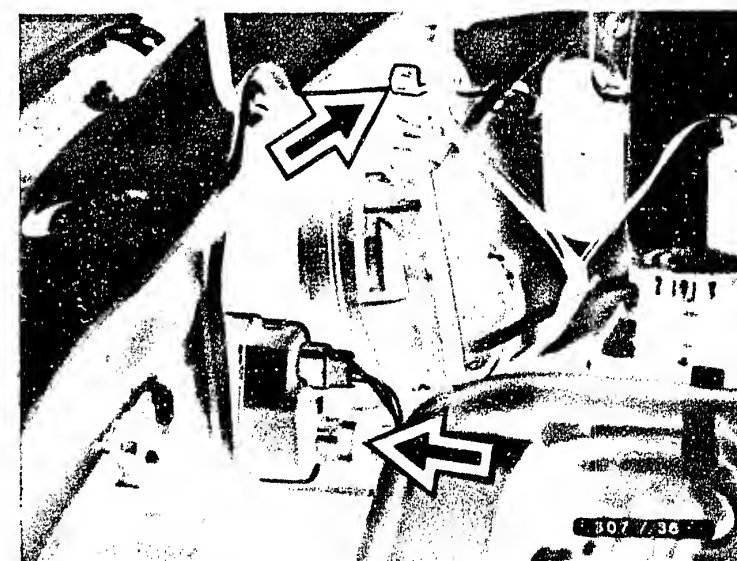
no

Set headlight aiming device to 12 cm inclination.
Repeat basic adjustment of headlights.



1 = Manual control

2 = Adjustment screw for headlight basic setting



F18

Testing and repair

Ford, headl. vert. aim contr.



F19

Testing and repair

Ford, headl. vert. aim contr.



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6. Check and adjust engine timing.....G	20



1. Test specifications

1.1 Idle speed:	$750 \pm 25 \text{ min}^{-1}$
-----------------	-------------------------------

1.2 Nozzle-opening pressure:	$125 \pm 8 \text{ bar}$
------------------------------	-------------------------

1.3 Injection timing

Engine position: Cyl. 1 at TDC

Pump position: 0.82 mm ABDC

1.4 Tightening torques

Injection-pump fastening screws	29 Nm
---------------------------------	-------

Fuel lines	25 Nm
------------	-------

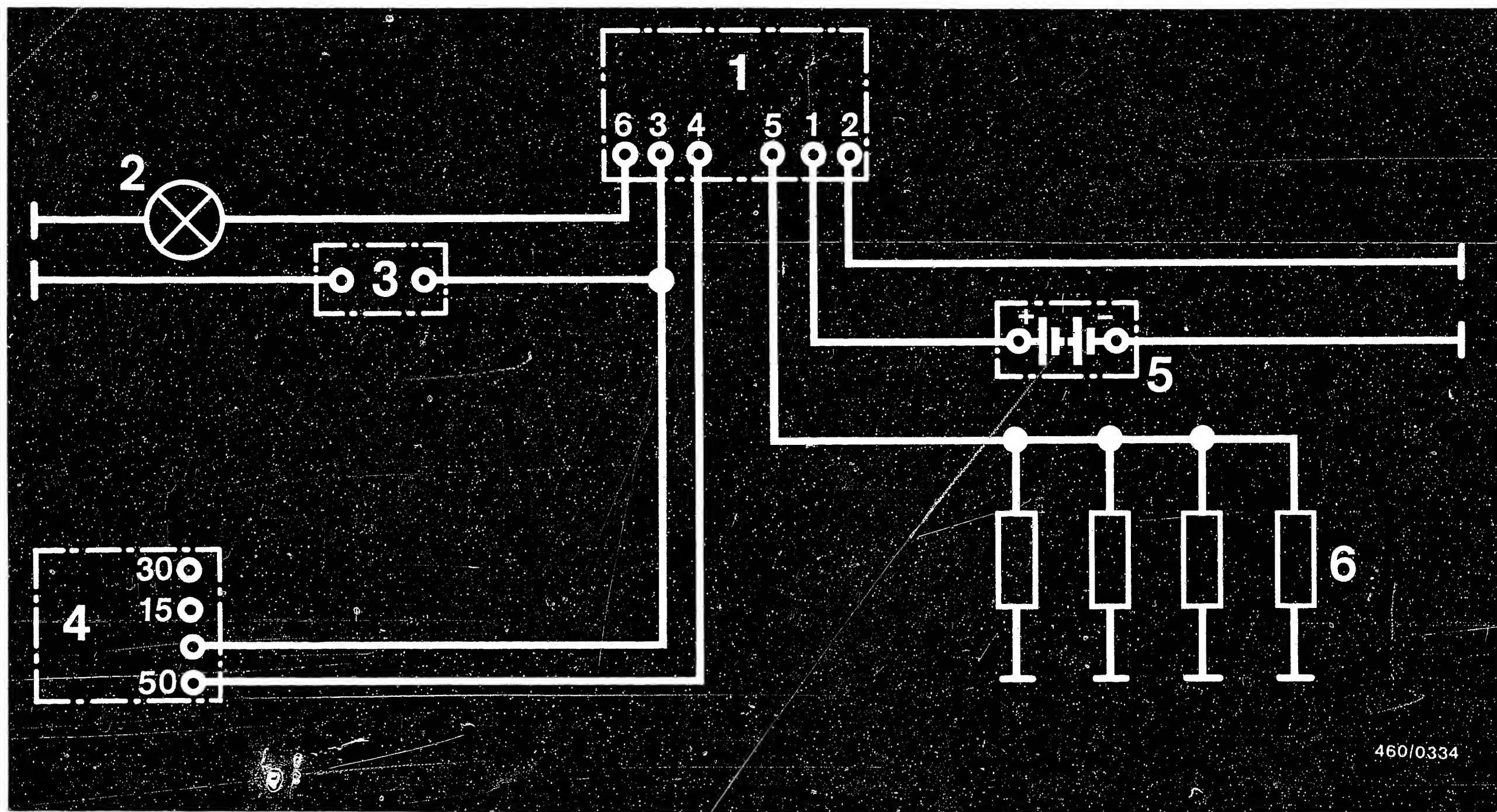
Injection-pump gear	49 Nm
---------------------	-------

Camshaft gear	118 Nm
---------------	--------

Nozzle-holder assemblies	78 Nm
--------------------------	-------

Toothed-belt tensioner fastening nut	56 Nm
---	-------





460/0334

2. Terminal diagram for preheating system

- 1 = Glow-duration relay
- 2 = Visual indicator
- 3 = Solenoid-operated valve

- 4 = Glow-plug and starter switch
- 5 = Battery
- 6 = Sheathed-element glow plugs

G3

Test preheating system
Fiat-Uno Diesel



G4

Test preheating system
Fiat-Uno Diesel

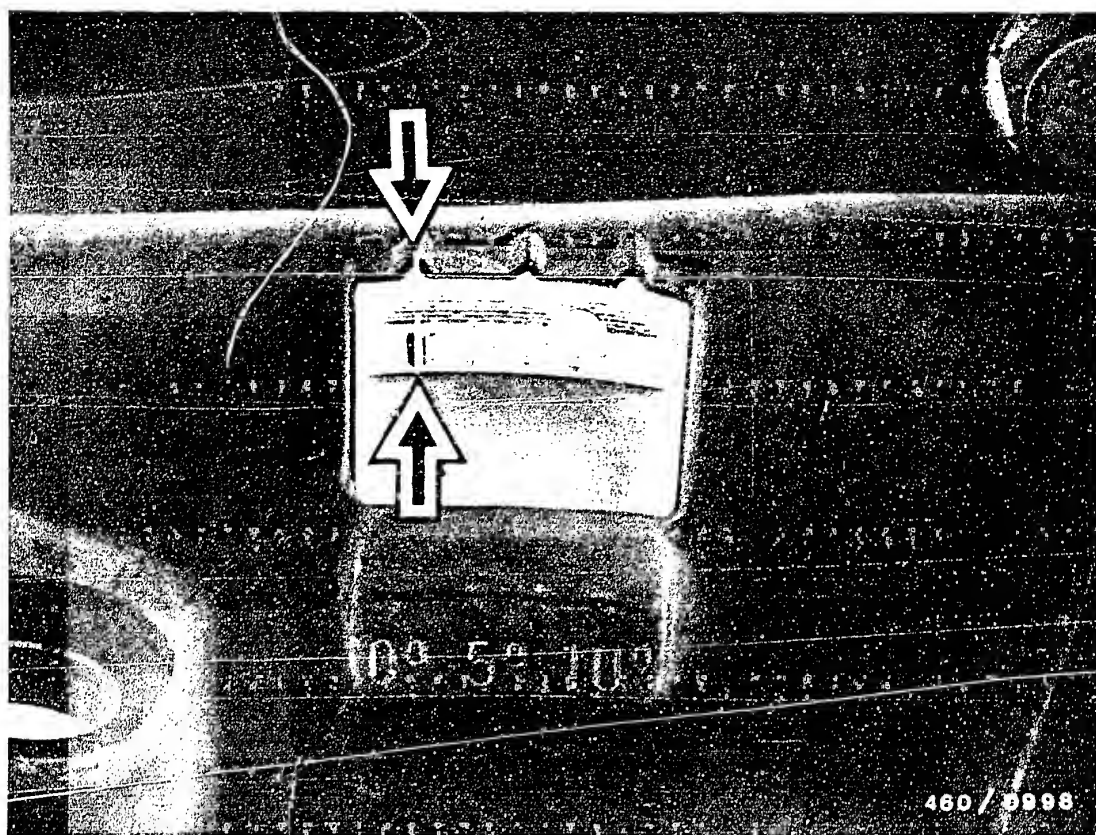


3. Test equipment and tools

Designation	Part Number	Use
Measuring tool	KDEP 1085	Injection timing
Mini dial indicator 1/100 mm divisions	commercially available e.g. Hahn & Kolb 7000 Stuttgart Part No. 33033 with	Injection timing
Adapter for measuring tool	KDEP 1127	---
Puller	A. 42 129*	Removing injection-pump gear
Holding device	A. 60 473*	Locking injection-pump gear
Box wrench	A 65 090*	Loosening injection pump

* to be obtained from Fiat agent.





4. Remove fuel injection pump

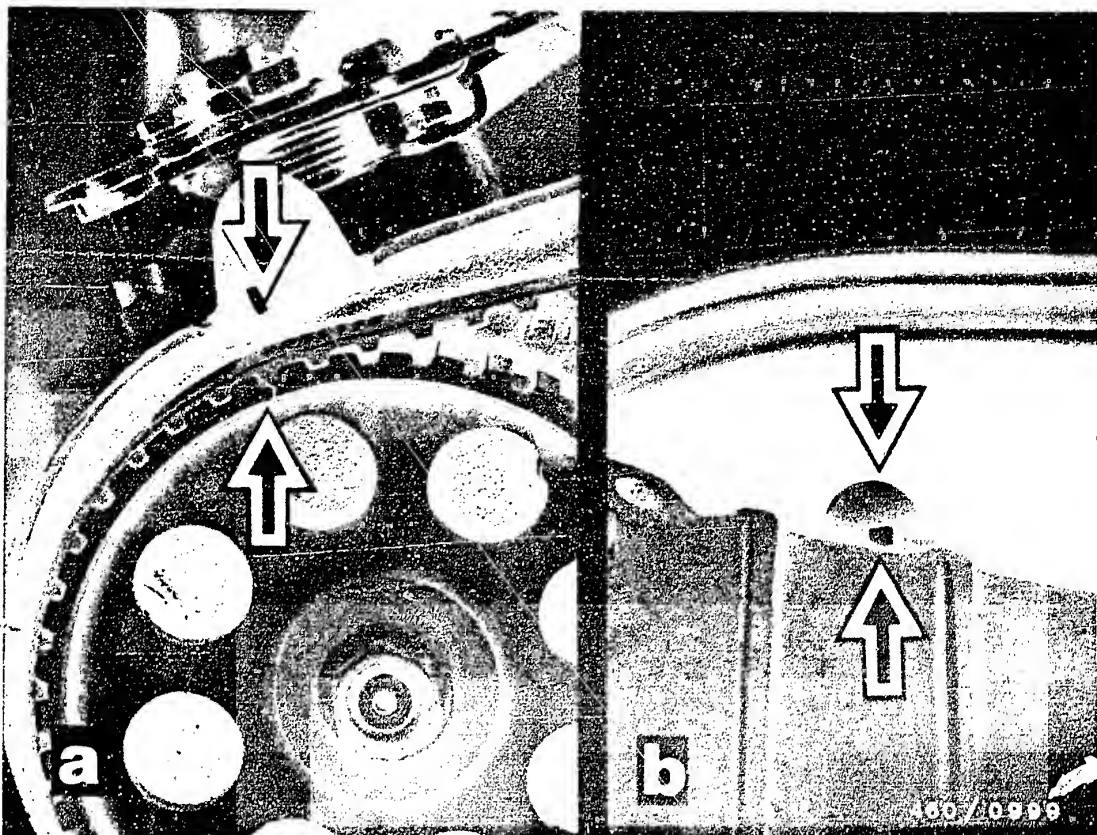
Disconnect negative cable from battery.

Remove sound-insulation cover and toothed-belt guard.

Turn crankshaft to TDC on cylinder 1.

The TDC mark on the flywheel must align with the reference mark (picture).





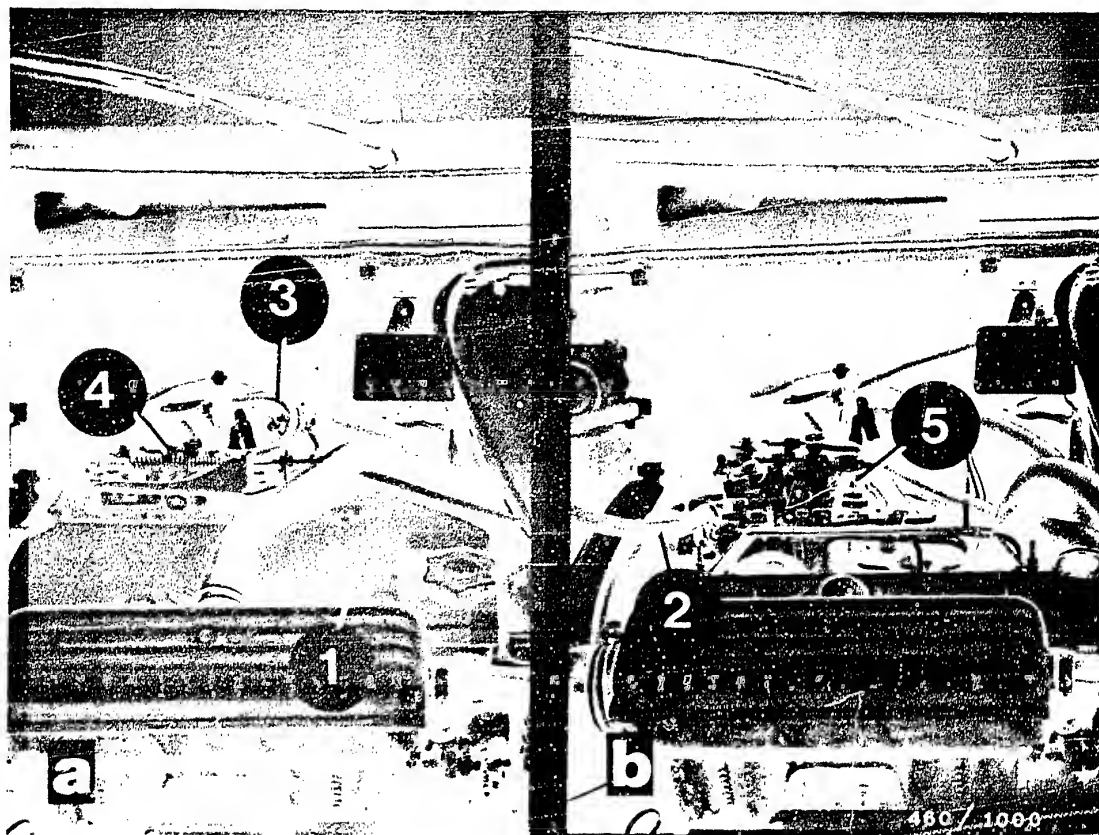
The mark on the pump drive gear points to the fixed mark on the toothed-belt protective cover (picture a).

The reference bore of the camshaft gear points to the fixed mark on the cylinder head (picture b).

G7

Remove fuel-injection pump
Fiat-Uno Diesel





Remove sound-insulation cover (1).

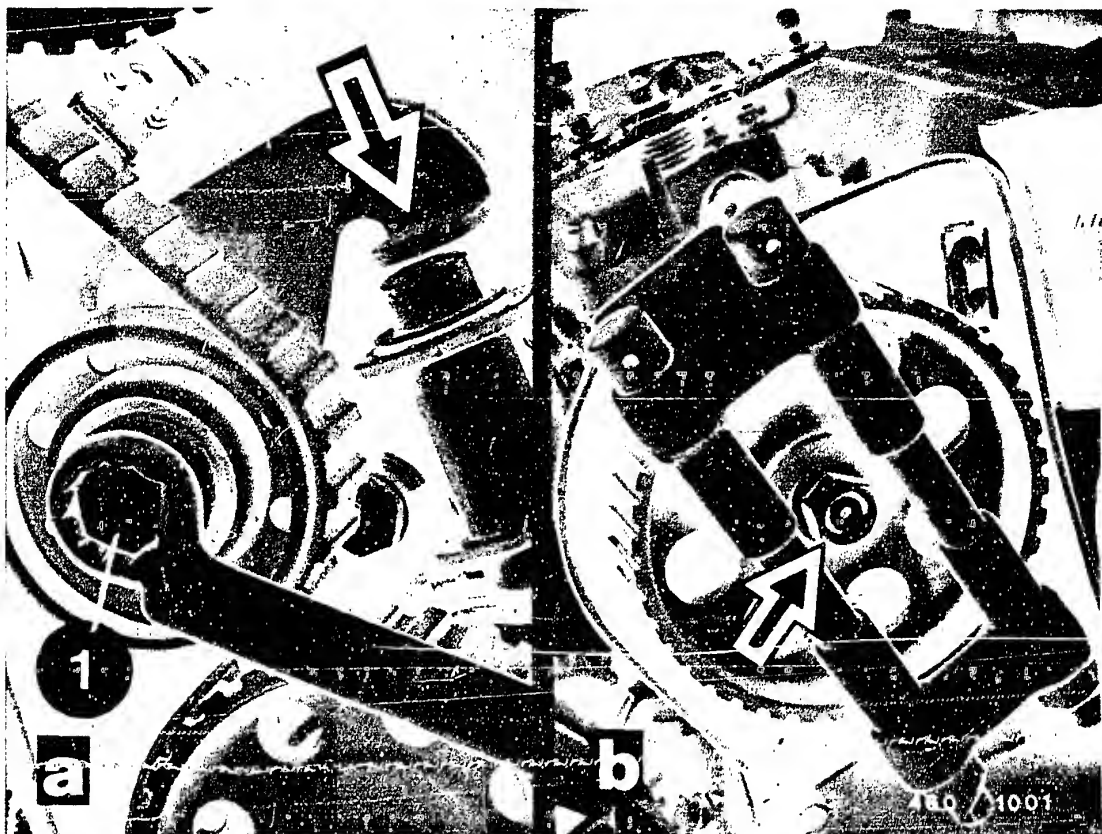
Remove fuel inlet line (2), fuel return line (3), cable (4) from control lever.

Remove electric lead (5) from shutoff solenoids and injection lines.

G8

Remove fuel-injection pump
Fiat-Uno Diesel



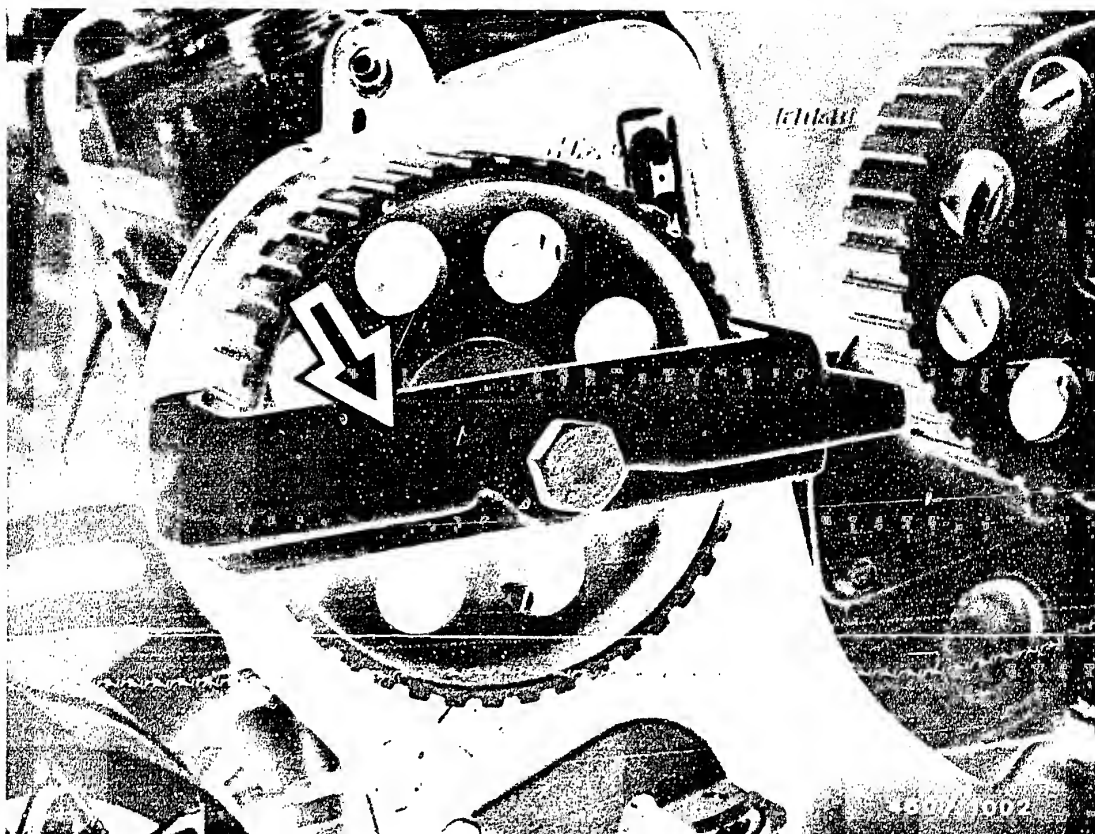


Loosen fastening screw of belt tensioning roller (1). Press belt tensioning roller in direction of arrow against the spring force of the belt tensioner (picture a).

Remove toothed belt from camshaft gear.

Mount holding device A 60 473 on injection-pump drive gear (picture b).

Loosen fastening nut of injection-pump gear and unscrew by approx 2 turns.



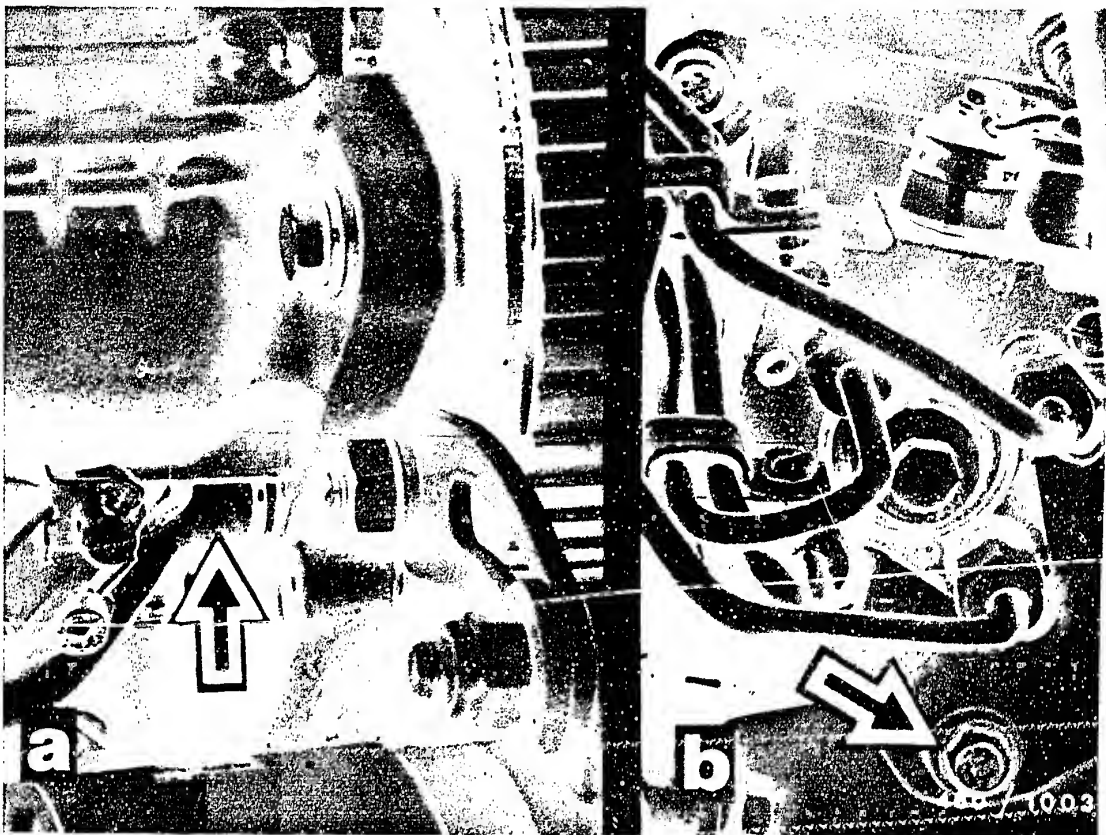
Remove holding device A 60 473 from injection-pump gear.
Mount puller A 42 129 (arrow) on pump drive gear.
Pull off pump drive gear.

Remove puller.
Unscrew fastening nut and take off injection-pump gear.

G10

Remove fuel-injection pump
Fiat-Uno Diesel





Remove fastening screws (3 pieces) of injection pump.

Note:

Remove the bottom fastening screw of the injection pump with box wrench A.65 090 (arrow - picture a).

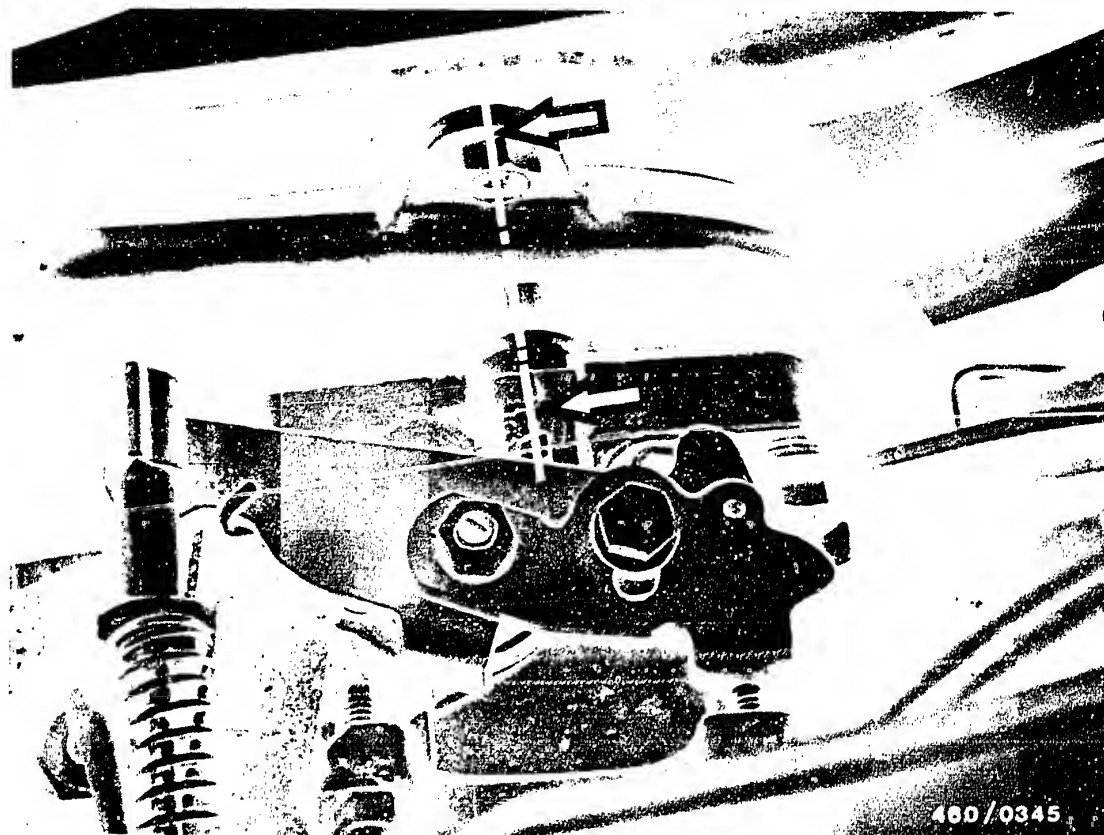
Remove fastening screw on support bracket of hydraulic head (picture b).

Remove injection pump from engine.

G11

Remove fuel-injection pump
Fiat-Uno Diesel



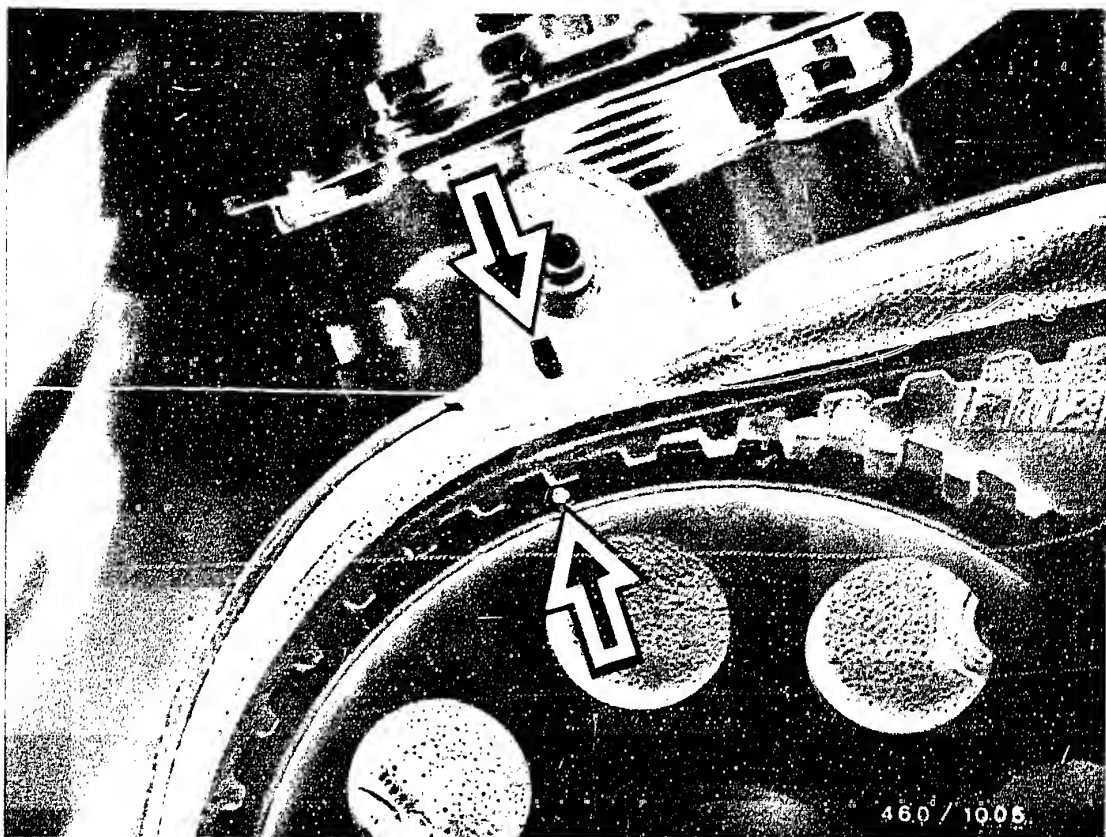


5. Install fuel-injection pump

Introduce fuel-injection pump so that the mark on the governor shaft and the tapped hole on the cover plate are in alignment.

Mount fastening screws of injection pump and finger-tighten.



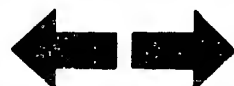


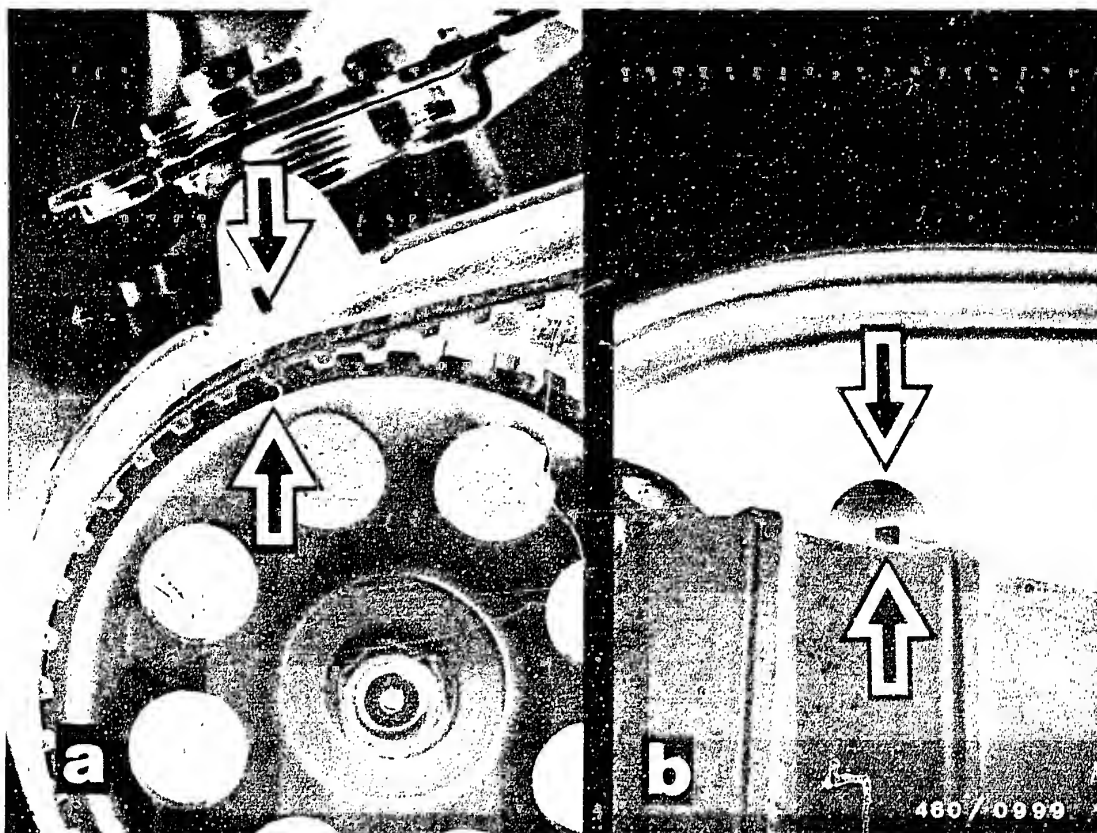
Mount injection-pump gear (woodruff key in cone of pump drive shaft must be installed) and turn so that the mark on the injection-pump gear points to the fixed mark on the toothed-belt protective cover (arrows).

Screw on fastening nut of injection-pump gear with retainer. Mount holding device A. 60 473. Tighten hexagon nut on injection-pump gear to 49 Nm.

G 13

Install fuel-injection pump
Fiat-Uno Diesel





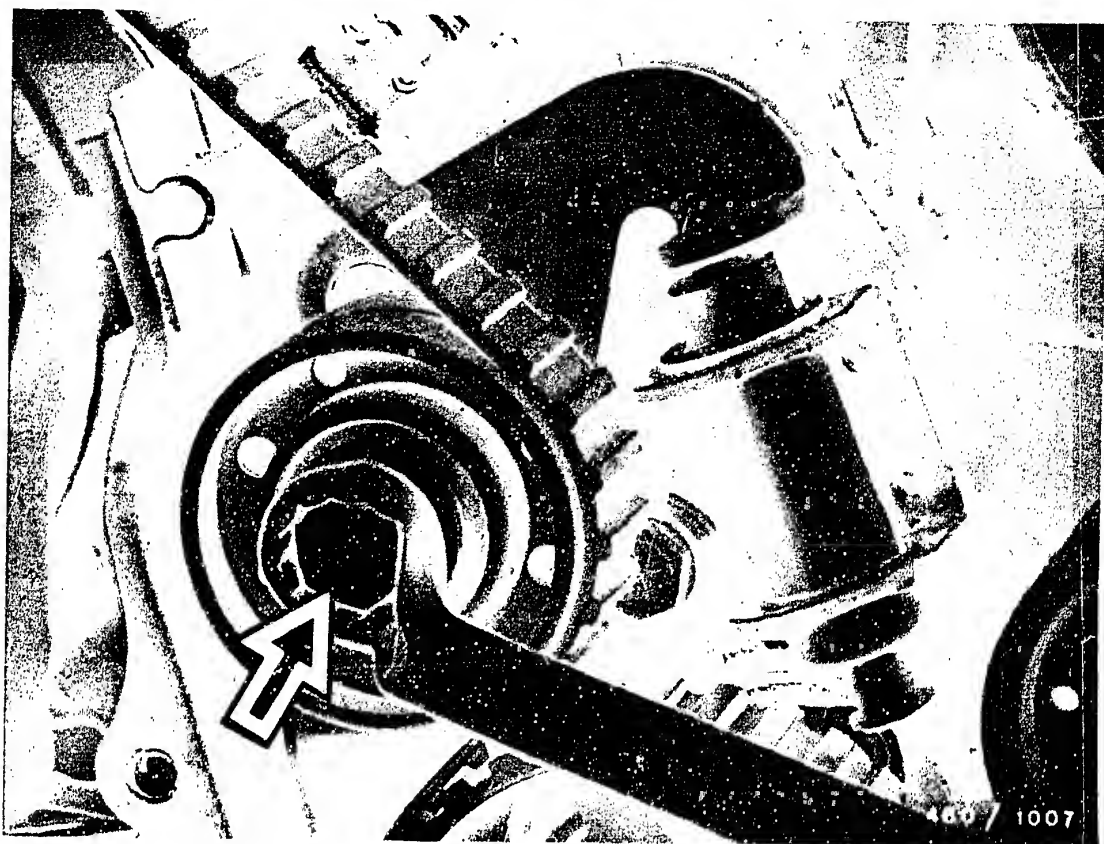
Place new toothed belt on injection-pump gear and camshaft gear.

The marks on the camshaft gear (b) and on the injection-pump gear (a) point to their reference points.

Caution

Whenever work on the injection pump involves loosening the toothed belt, fit a new toothed belt.

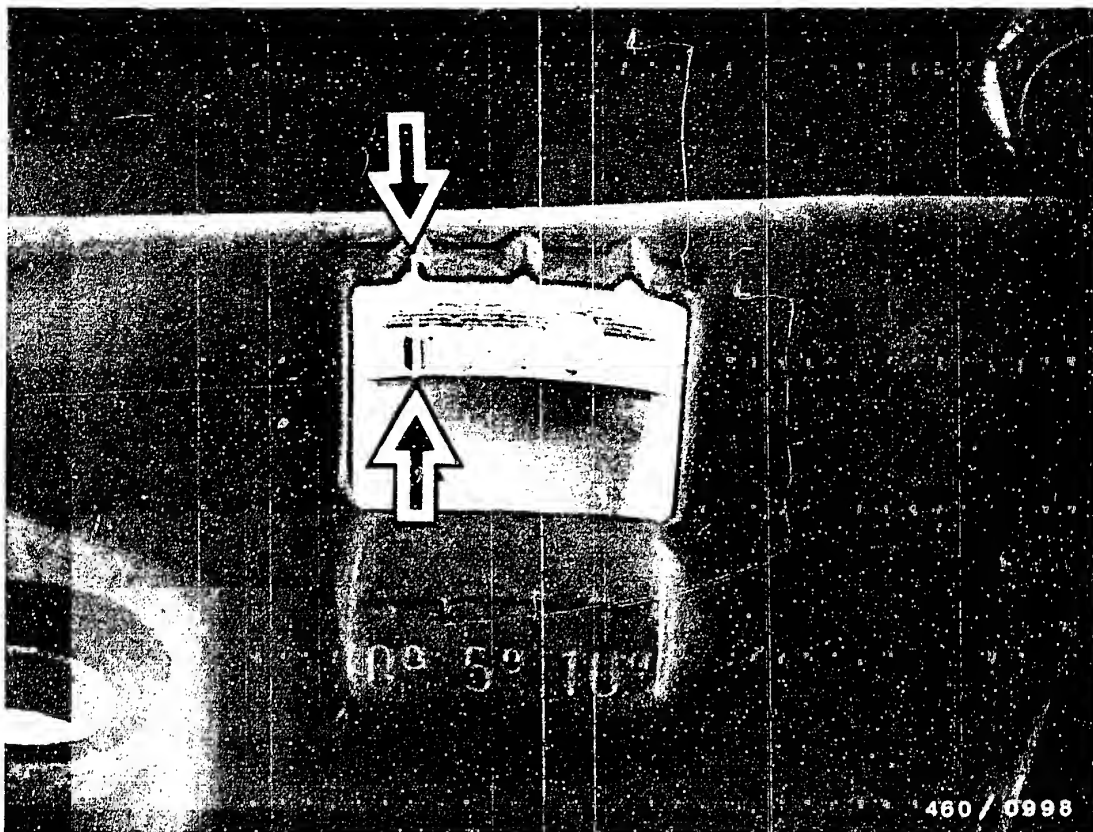




Loosen fastening screw (arrow) of belt tensioning roller until spring-loaded belt tensioner presses against toothed belt.

Re-tighten fastening screw. Turn engine over two full times in engine direction of rotation until the marks on camshaft gear, injection-pump gear and TDC mark on fly-wheel align with the reference points.

Loosen fastening screw of belt tensioning roller until spring-loaded belt tensioner presses against toothed belt. Tighten fastening screw to 57 Nm.

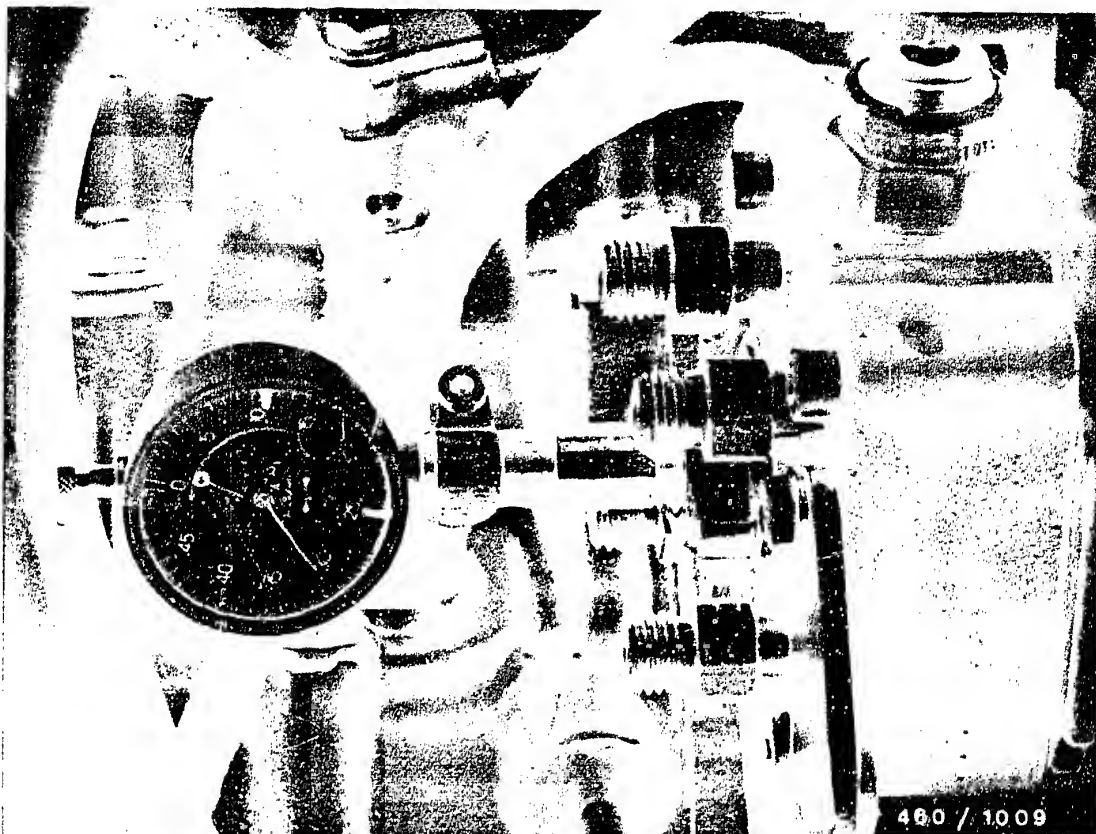


The TDC mark on the flywheel must align with the reference mark (arrow).

G16

Install fuel-injection pump _____
Fiat-Uno Diesel





Unscrew bleeder screw out of central screw plug (triangular plug) of hydraulic head.

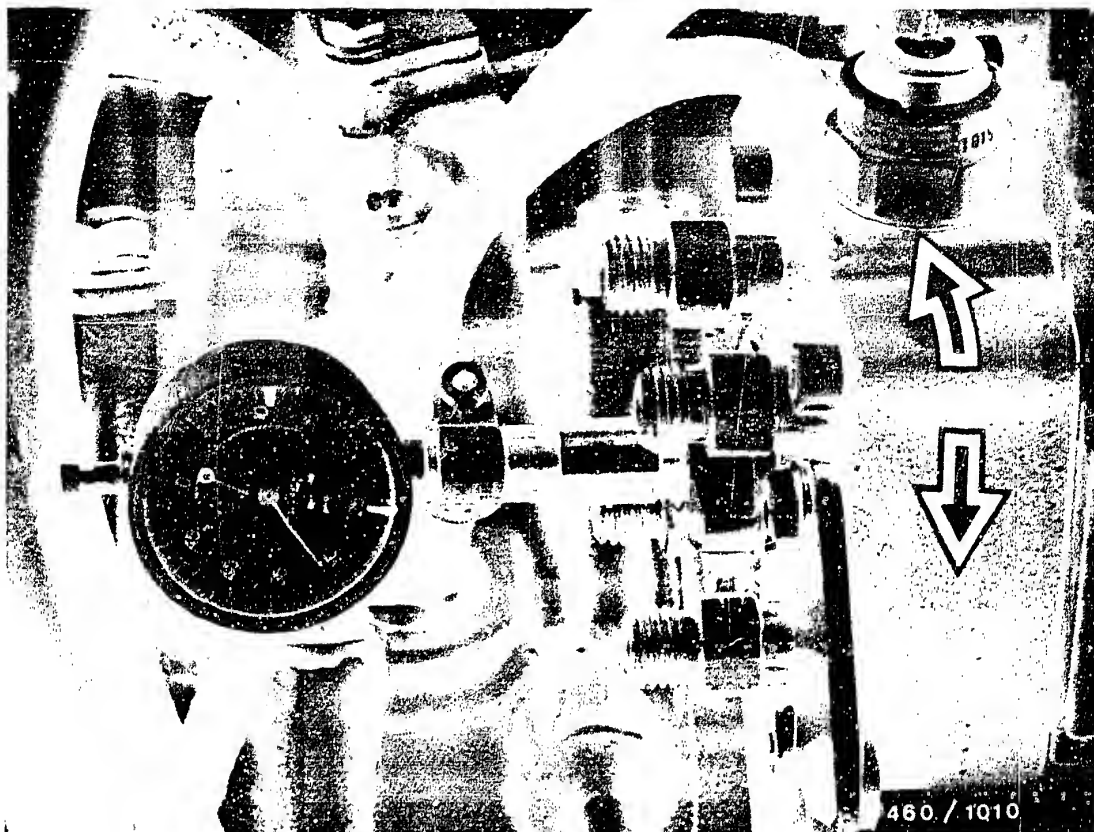
Mount measuring tool KDEP 1085 with dial indicator e.g. 1 687 233 011 in this bore and preload by approx 3 mm.

Turn engine against its direction of rotation until the pointer of the dial indicator no longer moves.
Preload dial indicator by approx 1 mm and set to "0".

Note:

~~Cold~~-start accelerator in zero position.





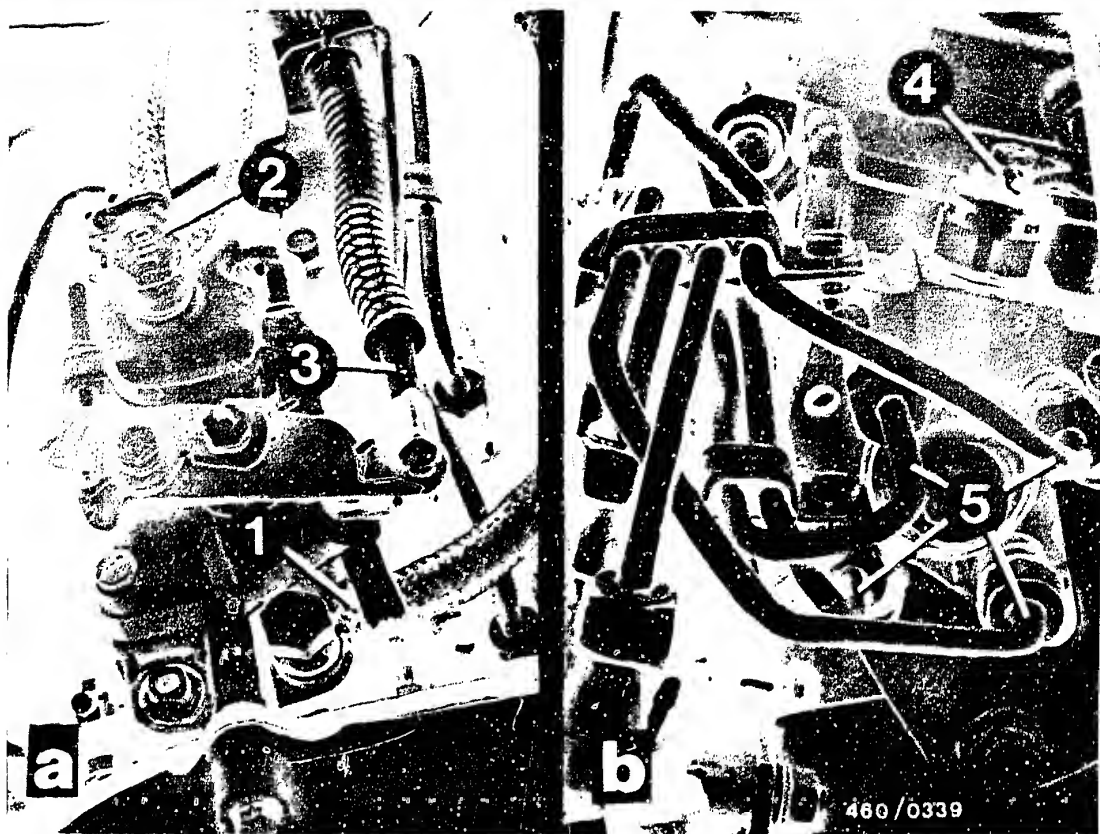
Turn engine in its direction of rotation until the marks on camshaft gear, injection-pump gear and TDC mark on the flywheel are in alignment (cylinder 1 at TDC). In this position, the dial indicator must indicate a stroke of 0.82 mm.

If a correction is necessary, loosen injection-pump fastening screws. Pivot injection pump until a stroke of 0.82 mm is obtained. Tighten fastening screw to 29 Nm. Turn engine over twice and check adjustment. Remove measuring tool KDEP 1085 with dial indicator. Mount bleeder screw with new seal ring.

G 18

Install fuel-injection pump
Fiat-Uno Diesel





Mount fuel inlet line (1), fuel return line (2), cable on control lever (3), electric lead on shutoff solenoid (4) and injection lines (5) on injection pump.

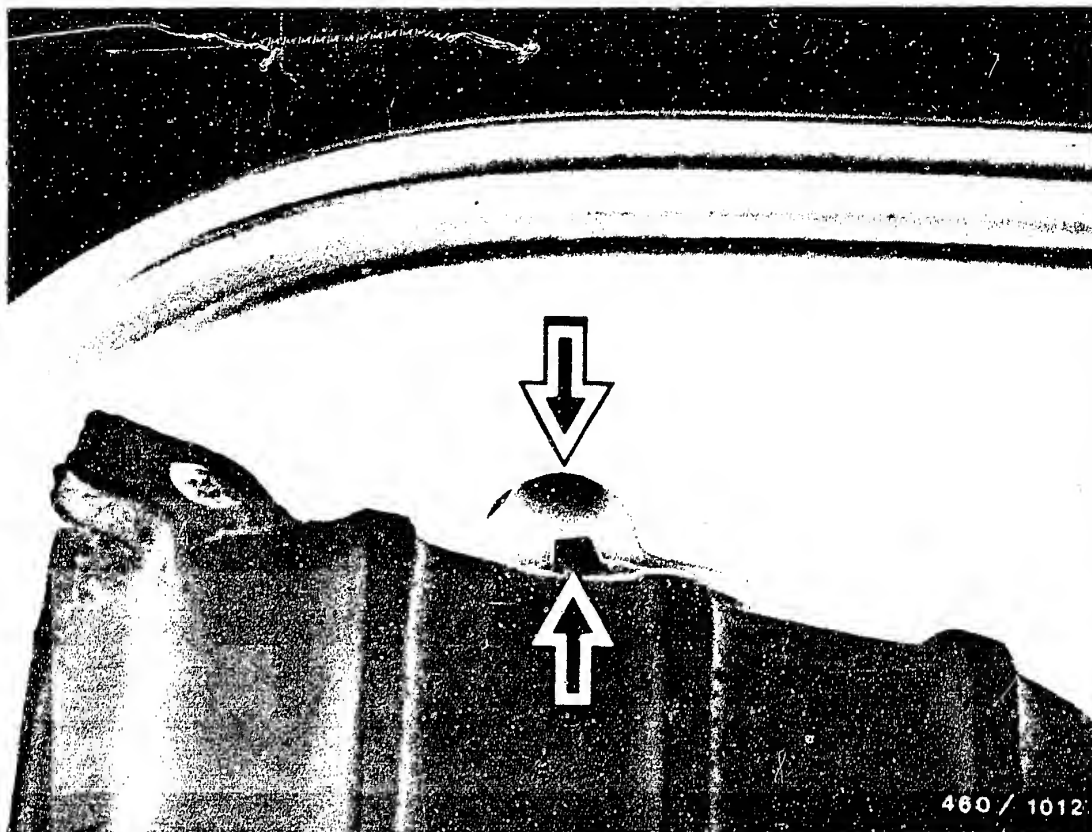
Note:

The inlet-union screws of the fuel inlet and return lines must not be mixed up. The inlet-union screw of the return is provided with a restriction bore and the head of the screw is marked "OUT".

Mount engine timing cover. Connect negative cable to battery.

Bleed fuel-injection system.





6. Check and adjust engine timing

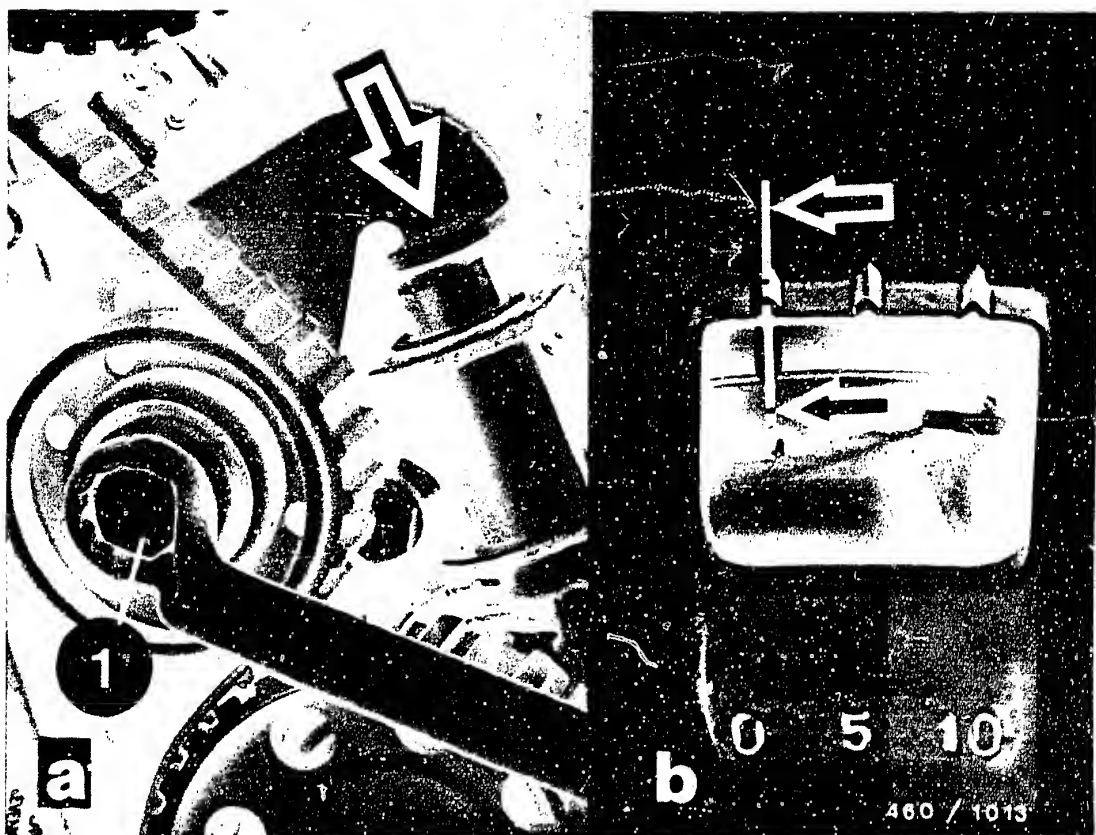
6.1 Check engine timing

Remove toothed-belt protective cover.
Turn crankshaft in engine direction of rotation until reference bore on camshaft gear and fixed mark on cylinder head are in alignment.

The marks on flywheel (cyl. 1 at TDC) and housing must be in alignment.

If the marks are not in alignment, it is necessary to adjust the engine timing.





6.2 Adjust engine timing

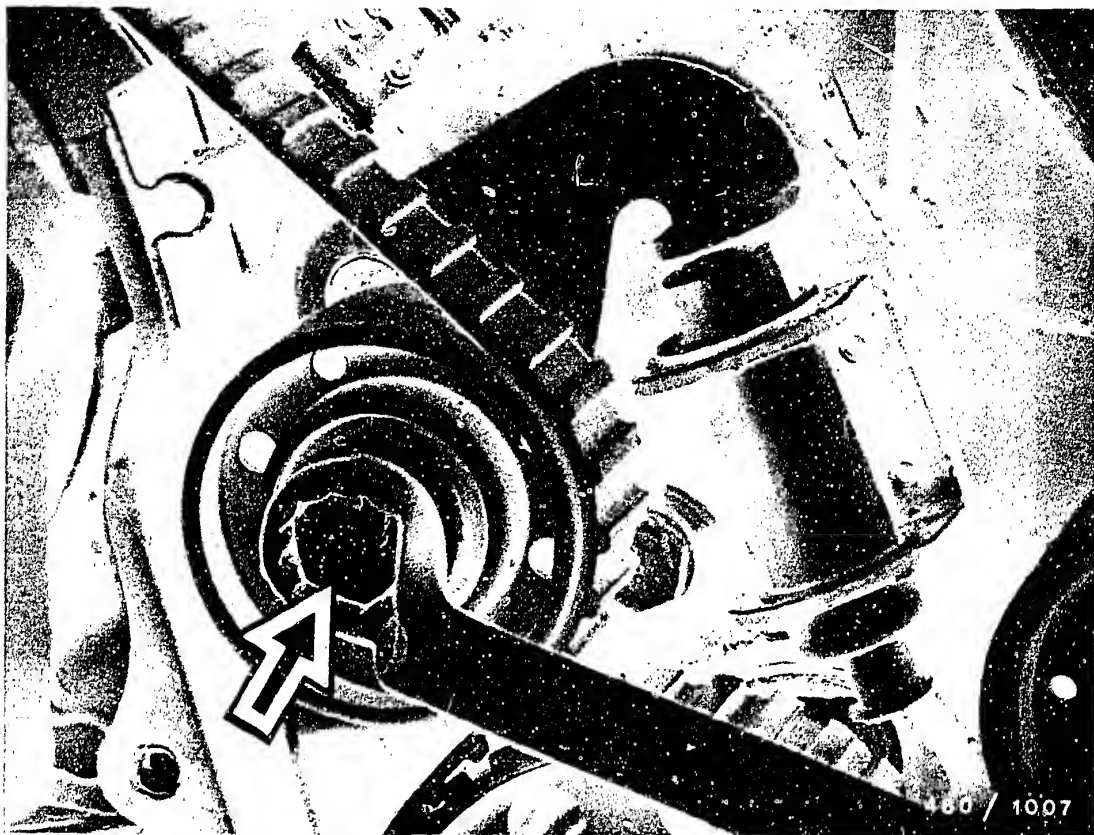
Loosen fastening screw (1) of belt tensioning roller. Press belt tensioning roller against spring force of belt tensioner (arrow, picture a) until toothed belt is loose.

Remove toothed belt from camshaft gear and injection-pump gear.

Turn crankshaft of engine until TDC mark on flywheel aligns with reference mark on cover plate (picture b). Put on toothed belt.

Make sure that marks on camshaft gear and injection-pump gear point to the reference points.





Loosen fastening screw of belt tensioning roller until spring-loaded belt tensioner presses against toothed belt. Tighten fastening screw.

Turn crankshaft over two full times in engine direction of rotation and check engine timing.

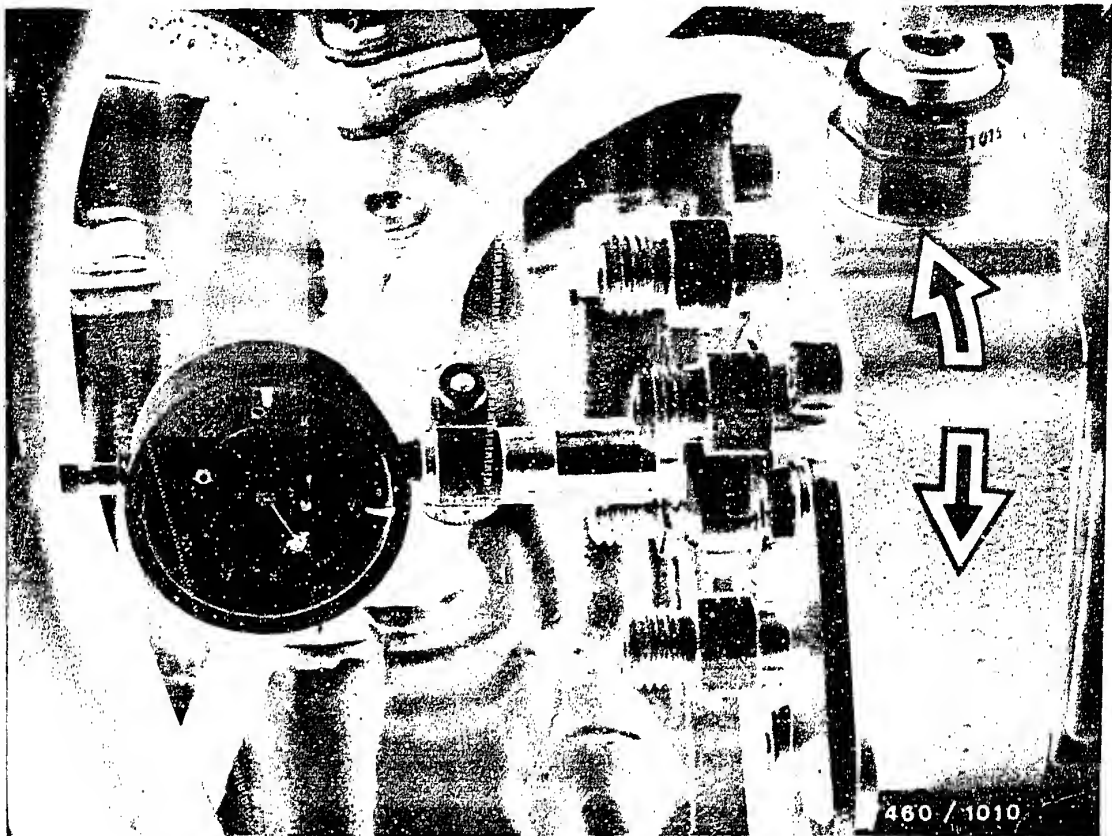
Loosen fastening screw of belt tensioning roller until spring-loaded belt tensioner presses against toothed belt. Tighten fastening screw to 57 Nm.

Remove injection lines. Prevent delivery-valve holders from coming loose by holding with a wrench.

Remove bleeder screw.

Mount measuring tool KDP 1085 and preload by 3 mm.





Turn crankshaft against engine direction of rotation until pointer of dial indicator no longer moves. Turn crankshaft in engine direction of rotation until the marks on camshaft gear, injection-pump gear and crankshaft gear are in alignment.

In this position, the dial indicator must indicate a stroke of 0.82 mm.

Make corrections by pivoting the injection pump. Turn crankshaft over twice and check adjustment.

Remove measuring tool KDEP 1085. Mount bleeder screw with new seal ring. Mount injection lines and toothed-belt protective cover.



T A B L E O F C O N T E N T S

<u>Section</u>	<u>Coordinates</u>
1. Special features	H 2
2. Test specifications	H 3
3. Exhaust-gas sampling and measuring	H 8
4. Electrical safety circuit	H 10
5. Diagram of fuel lines	H 13
6. General safety instructions	H 15
7. Installation position of individual components.....	H 16



1. Special features

- K-Jetronic
- In-tank electric fuel pump
- For automatic transmissions only: Solenoid-operated air valve in bypass around throttle valve
- Warm-up regulator with full-load enrichment.
- Connecting-parts set KDJE-P100/12 is required for connecting pressure tester KDJE-P100 to the warm-up regulator inlet.
- Note:
The K-Jetronic in the Lancia Thema 6V is basically the same as that in the Renault R30 TX.
Similar SIS repair instructions:
Microcard REN-01/J1.



2. Test specifications

Test step

Test specifications*

2.1 Electric fuel pump

0 580 254 011

- Fuel delivery: min. 950 cm³/30s
- Connection voltage: min. 11.5V under load

2.2 Fuel distributor

0 438 100 137

- Primary pressure

Test specifications:

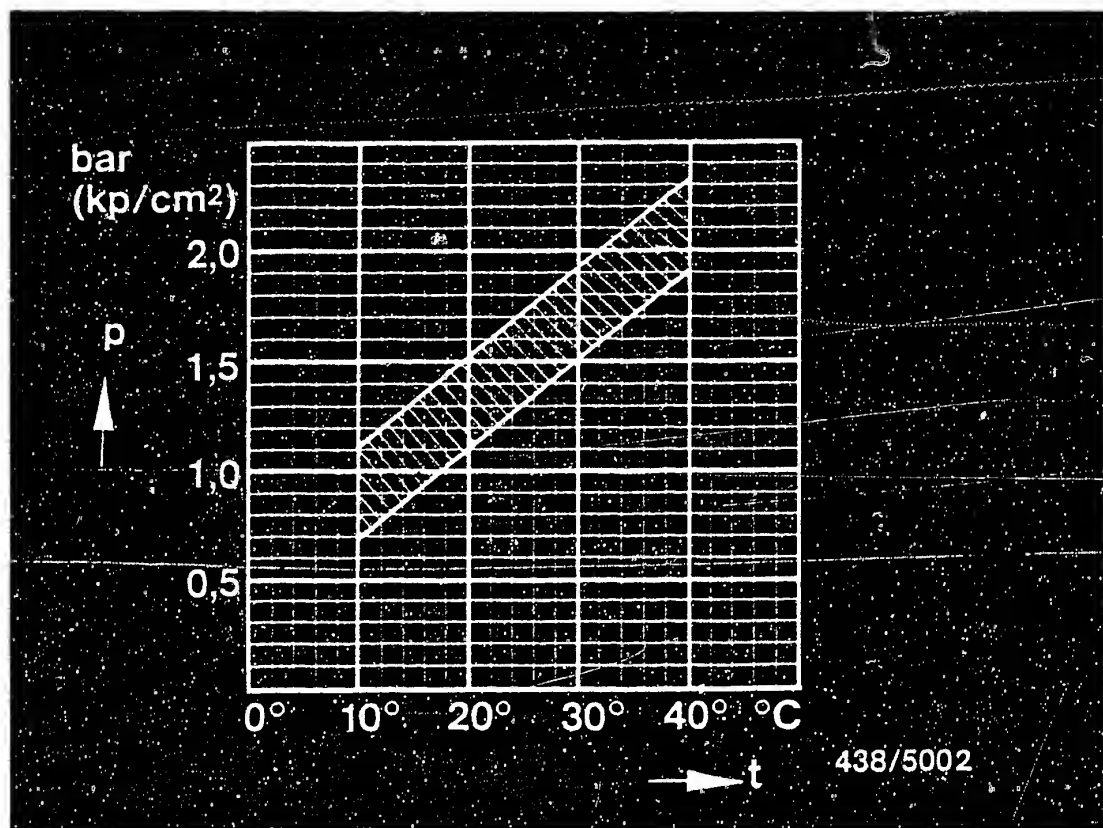
Setting value:

4.7...5.4 bar
(4.8...5.5 kgf/cm²)

4.9...5.1 bar
(5.0...5.2 kgf/cm²)

* Pressures indicated in the table of test specifications in bar (gauge pressure) or in kgf/cm² (gauge pressure).





p = Control pressure (gauge pressure)
t = Ambient temperature

2.3 Warm-up regulator 0 438 140 143

Version with full-load enrichment.

- Delivery for the control pressure circuit:
160...240 cm³/min.

• "Cold" control pressure

Connect up the vacuum pump to the intake manifold connection of the warm-up regulator for testing.

- Setting value: 500...550 mbar
(375...414 mmHg)

Test step

Test specifications*

• "Warm" control pressure

Warm-up regulator 0 438 140 143
(Version with full-load enrichment)

- Testing at atmospheric pressure
(without vacuum): 2,6...3,0 bar (2,7...3,1 kgf/cm²)

- Connect a vacuum pump to the intake manifold connection of the warm-up regulator for testing.

Settings:

500...550 mbar
(373...412mmHg): 3,1...3,5 bar (3,2...3,6 kgf/cm²)

- Checking the fuel-load diaphragm for leaks
Maximum allowable pressure drop from setting value: 100 mbar (75mmHg)/15s

2.4 Fuel accumulator 0 438 170 034

- Testing for leaks

Min. pressure:	after 10 mins.	after 20 mins.
	2.7 bar (2.8 kgf/cm ²)	2.6 bar (2.7 kgf/cm ²)

- * Pressures indicated in the test specifications in bar (gauge pressure) or in kgf/cm² (gauge pressure)



Test step

Test specifications*

2.5 Fuel-injection valve 0 437 502 022

- Opening pressure: 3.0...4.1 bar
(3.1...4.2 kgf/cm²)
- Testing for leaks,
at min. 2.8 bar: No drop is allowed with-
in 25 s.

2.6 Fuel distributor

- Comparative measurement of fuel deliveries:

Setting		max. allowable fuel delivery
Idle	6.0 cm ³ /min.	6.6 cm ³ /min.
Part load	40.0 cm ³ /min.	43.0 cm ³ /min.
Full load	145,0 cm ³ /min.	160,0 cm ³ /min.
This fuel delivery must be attained at a minimum at each outlet.		

* Pressures indicated in the table of test specifications in bar (gauge pressure) or in kgf/cm² (gauge pressure).



Test step

Test specifications

2.7 Thermotime switch (non-Bosch product)

- Measurement of resistance between

at a temperature less than more than °C °C	Term. "G" and "ground" (housing)	Term. "W" and ground (housing)	Term. "G" and Term. "W"
+30	25...40 Ω	0 Ω	25...40 Ω
+40	50...80 Ω	100...160 Ω	50...80 Ω

2.8 Idle adjustment*

- Idle speed

Manual transmission

800...900 min⁻¹

Automatic transmission

850...950 min⁻¹

- CO concentration

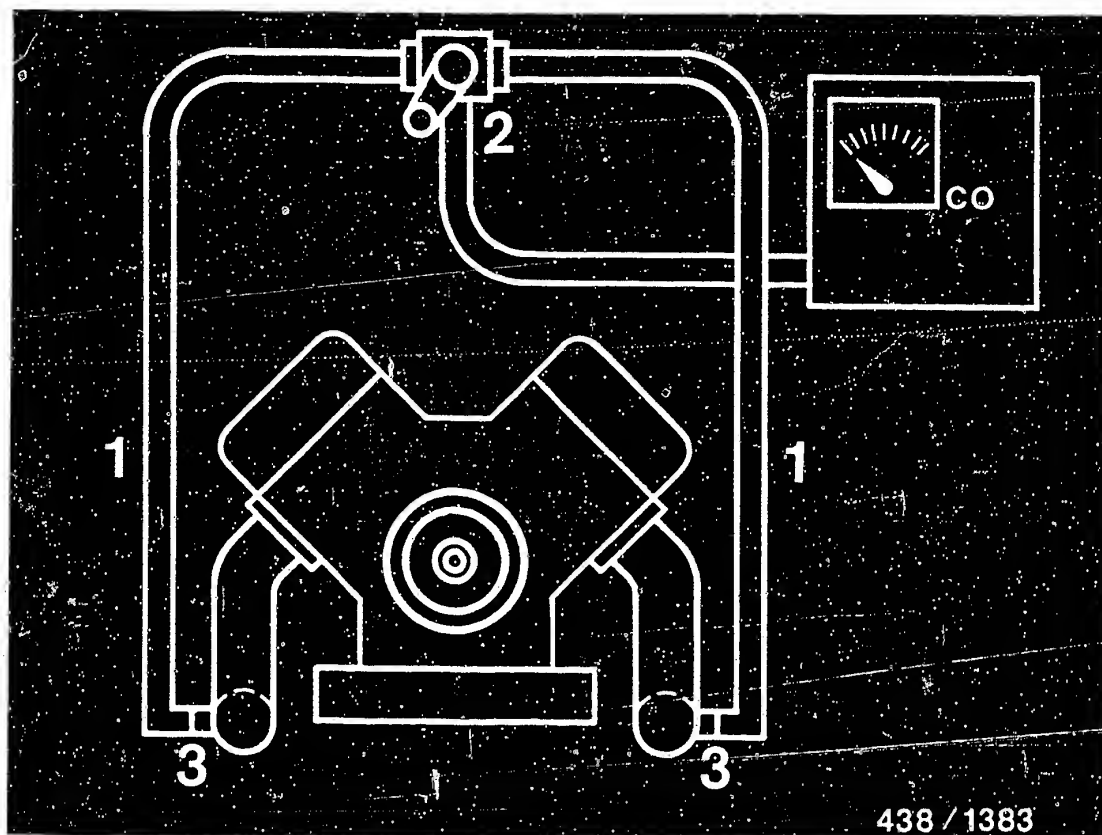
for each cylinder bank

1.0...2.0 vol. %

- * Adjusting/checking the idle:

Switch off air conditioner. Engine at normal operating temperature; oil temperature approx. + 80°C. Radiator fan must not be operating when making the adjustment.





3: Exhaust-gas sampling and measuring with user-fabricated exhaust-gas sampling set

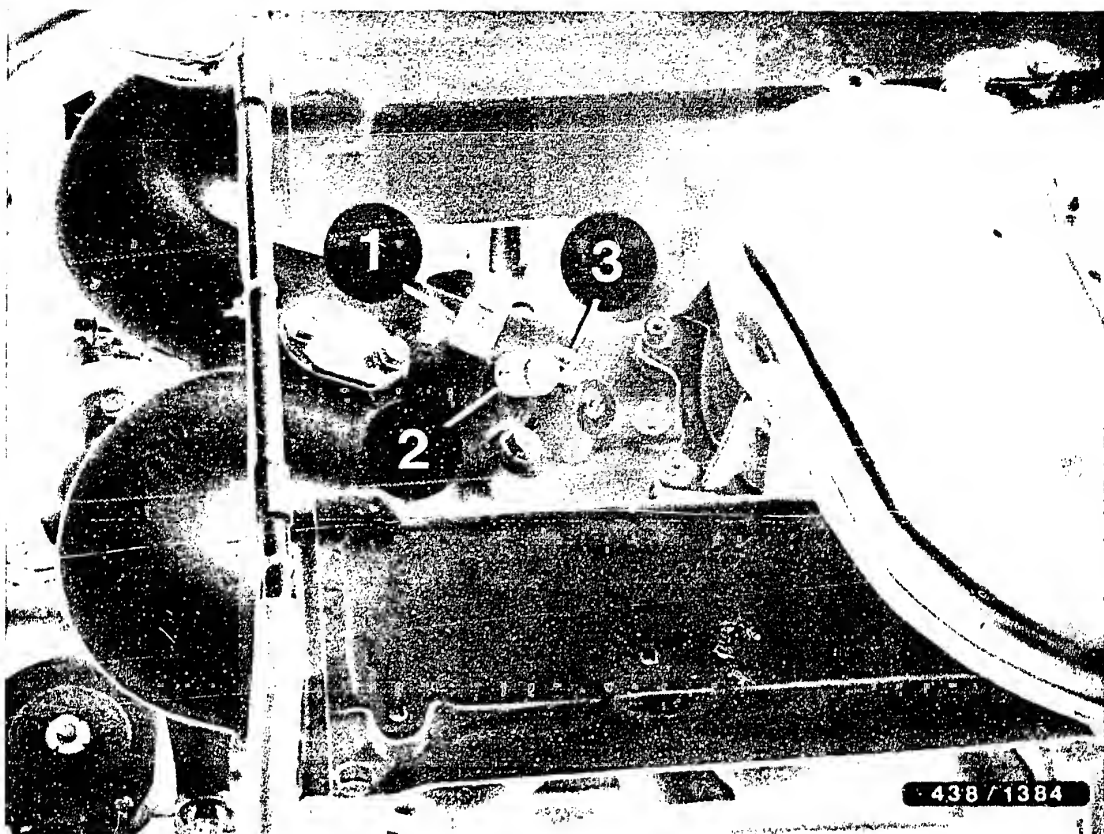
The exhaust gas for the CO measurement is sampled separately from both cylinder banks.

For this purpose, there are fittings (sealed by cap nuts) on the floor of the vehicle, on the sides of the exhaust pipes.

The two hose lines (1) are routed together at a 3-way change-over cock and are connected to the fittings (3). With the 3-way change-over cock (2) in the center position, the CO concentration must conform to the specifications.

Make an adjustment using the idle-mixture-adjusting screw in the mixture-control unit.



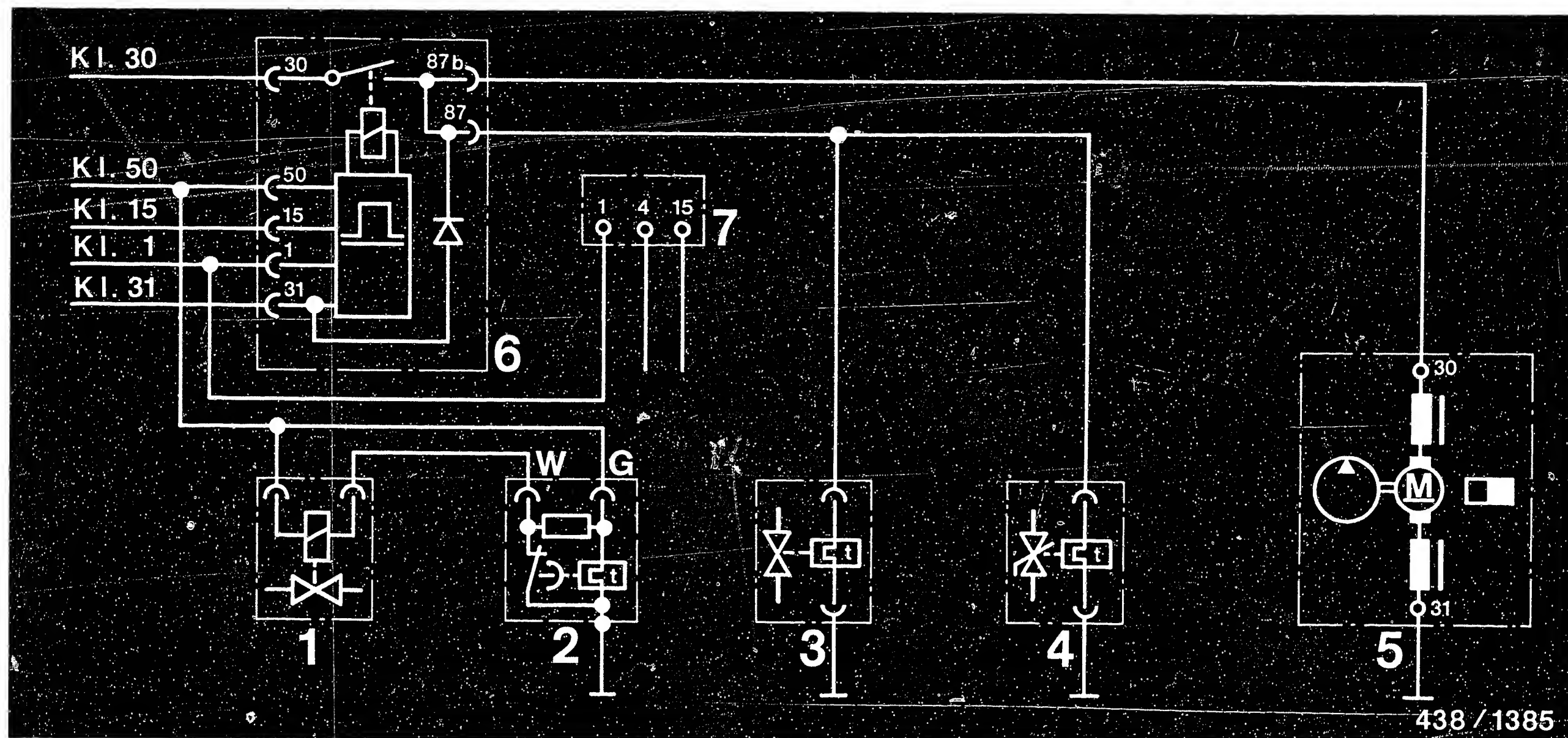


If necessary, after correcting the CO setting, re-adjust the idle speed at adjusting screw 3.

Then individually check the CO concentration of both cylinder banks by changing over the 3-way cock. Make correction at adjusting screw 1 or 2 until both cylinder banks are set to the same value at idle speed.

All settings (engine speed, CO concentration of both cylinder banks, total CO) may possibly have to be repeated several times until all values are within the specified range.





438 / 1385

- 1 = Start valve
- 2 = Thermo-time switch
- 3 = Warm-up regulator
- 4 = Auxiliary-air device

- 5 = Electric fuel pump
- 6 = Electronic relay
- 7 = Ignition coil

4. Electrical safety circuit

4.1 Circuit diagram

The safety circuit employs an electronic relay which is energized from terminal 1 of the ignition coil.

H10

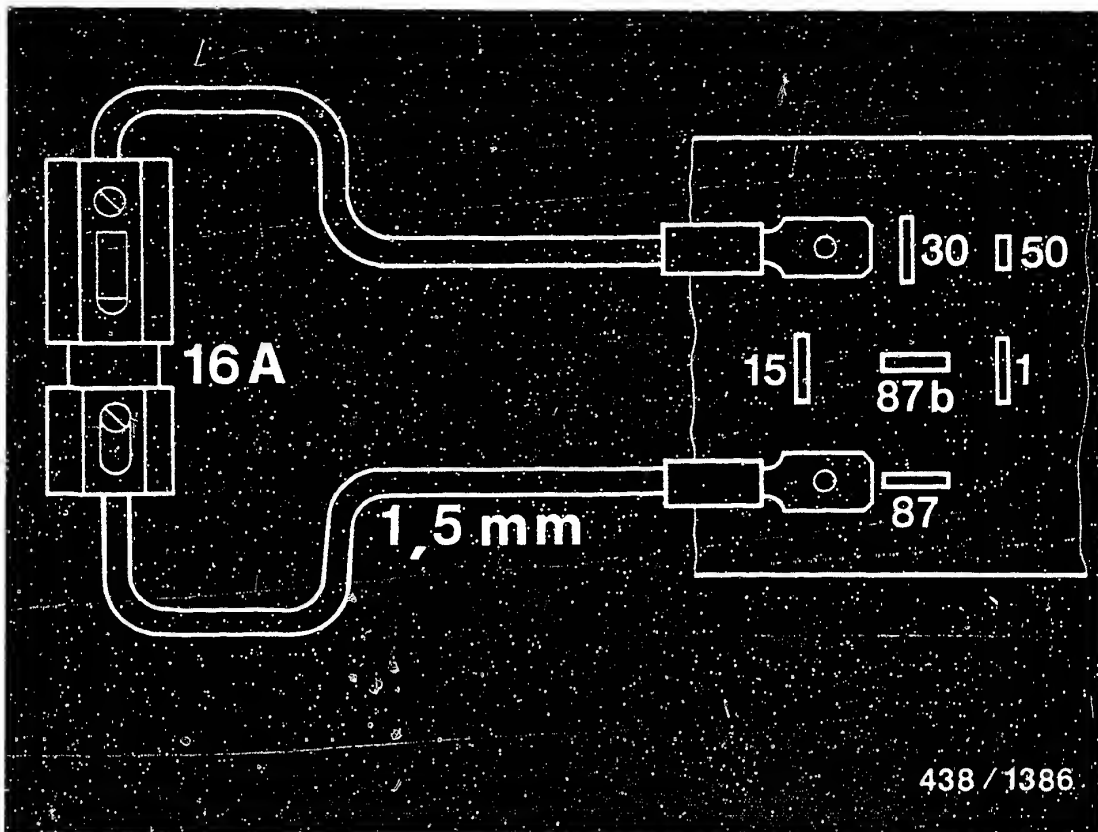
Electrical safety circuit
Lancia Thema V6



H11

Electrical safety circuit
Lancia Thema V6





438 / 1386

4.2 Bridging the safety circuit for testing

Pull electronic relay out of plug-in base.

Using a jumper, connect contact 87 (or 87b) to contact 30 in the plug-in base.

Use connecting lead 1.5 mm² with fuse holder and 16 A fuse.

This supplies battery voltage to electric fuel pump, warm-up regulator and auxiliary-air device.

CAUTION!

Never deflect the air-flow sensor plate while the electric fuel pump is running (press it down), because that results in fuel being injected via the fuel-injection valves.

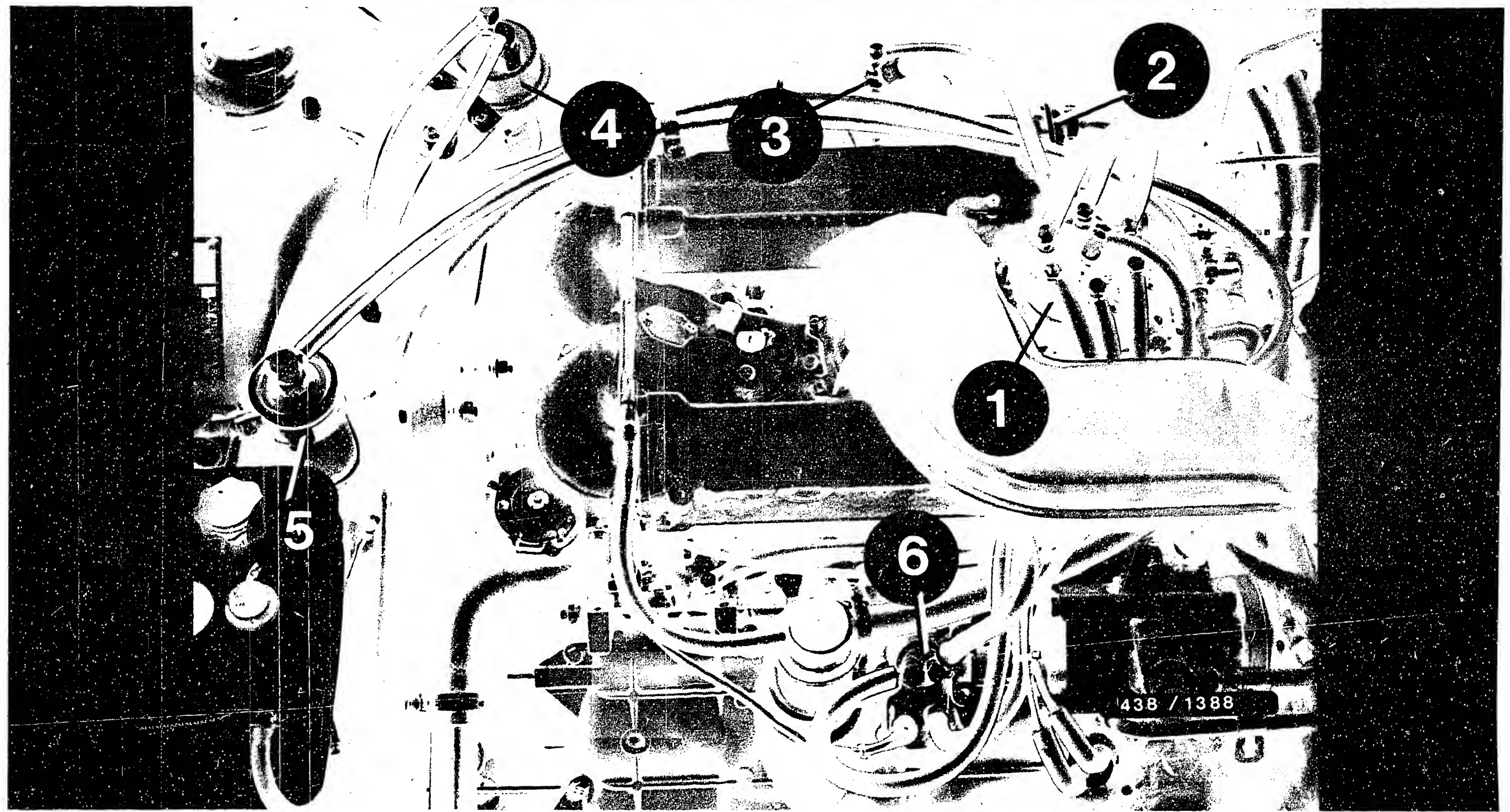
A subsequent activation of the starting motor can then cause extremely serious damage to the engine!



6. General safety instructions for work on the K-Jetronic

- Never deflect the air-flow sensor plate (never depress) with the electric fuel pump running, since fuel will be injected through the injection valves. Subsequent operation of the starting motor may lead to serious engine damage.
- When testing the injection valves with a valve tester, note the regulations on test media. Never test with normal gasoline or other easily inflammable liquids. Even when using test gasoline, follow the local safety regulations.
- Leak test on engine intake system only with permissible leak-detector spray (e.g. Gypoflex). Do not use any easily inflammable liquids. Follow the local safety regulations.





1 = Mixture-control unit
2 = Auxiliary-air device

3 = Start valve
4 = Fuel accumulator

5 = Fuel filter
6 = Warm-up regulator

7. Installation position of individual components

7.1 Arrangement of components on engine

H16

Installation position of components
Lancia Thema V6



H17

Installation position of components
Lancia Thema V6



7.2 Further components

In the engine compartment

- The control relay is on the battery bracket on the left-hand side in the engine compartment.
- The thermo-time switch is screwed into the coolant distributor on the right-hand side on the engine.



TABLE OF CONTENTS

<u>Section</u>	<u>Coordinates</u>
1. Test specifications	J 2
2. Terminal diagram of preheating system	J 3
3. Tools, test equipment	J 5
4. Remove fuel-injection pump	J 6
5. Install fuel-injection pump	J 10
6. Check and adjust engine timing	J 16
7. Check charge-air pressure	J 24



1. Test specifications

1.1 Idle speed: 700 + 50 min⁻¹

1.2 Nozzle-opening pressure: 157 + 8 bar

1.3 Injection timing:

Engine position: Cylinder 1 at TDC

Setting value

Pump position: 0.90 mm ABDC

1.4 Charge-air pressure: 0.87 bar

1.5 Compression pressure: approx. 22 bar

1.6 Tightening torques

Injection-pump gear
(Hexagon nut) 98 Nm

Sheathed-element glow plugs 15 Nm

Nozzle-holder assembly
fastening screws 49 Nm

Fastening nuts for intake/
exhaust manifold 25 Nm

Fuel lines 25 Nm

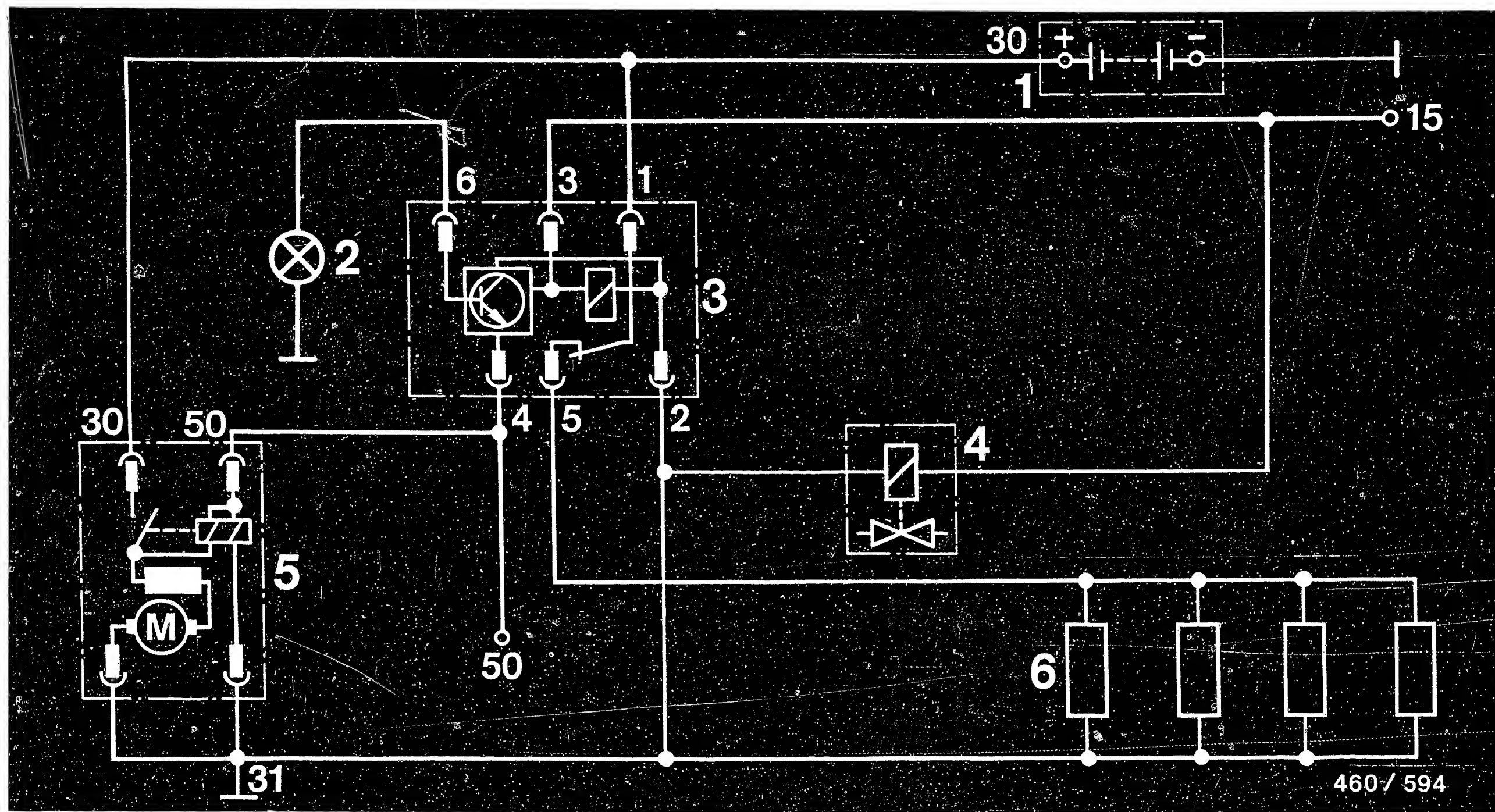
Screw plug 10 Nm

Injection-pump fastening screws 25 Nm

Note:

The installed diesel engine is basically the same as that in the Fiat Argenta 2500 Turbo-Diesel.
Similar SIS instructions: Microcard FIA 502.





1 = Battery
2 = Glow-plug indicator lamp

3 = Glow-duration unit
4 = Solenoid-operated valve

5 = Starting motor
6 = Sheathed-element glow plugs

2. Connection diagram for preheating system

J3

Connection diagram - preheating system
Lancia Thema 2500 Turbo-Diesel



J4

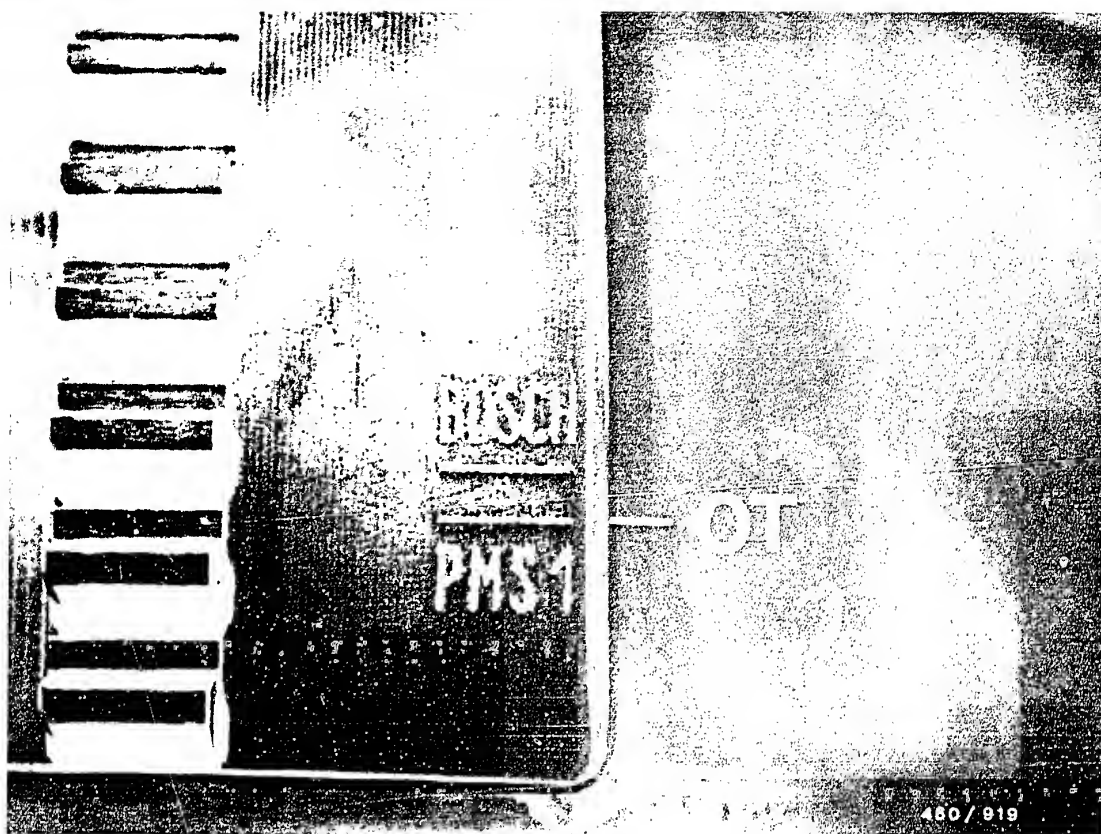
Connection diagram - preheating system
Lancia Thema 2500 Turbo-Diesel



3. Test equipment and tools

Designation	Part No.	Use
Box wrench	KDEP 1115	Loosening/ tightening fuel- injection lines
Measuring tool	KDEP 1085	Injection timing
Mini-dial indicator graduation 1/100 mm	1 687 233 011	Injection timing
Pressure tester or pressure gauge 0...1.6 bar	KDJE-P 100 e.g., Wika No. 4 184	Testing charge- air pressure
Locating pin	commercially available	Locking injection- pump gear/cams- haft gear





4. Remove fuel injection pump

Disconnect negative lead from the battery.

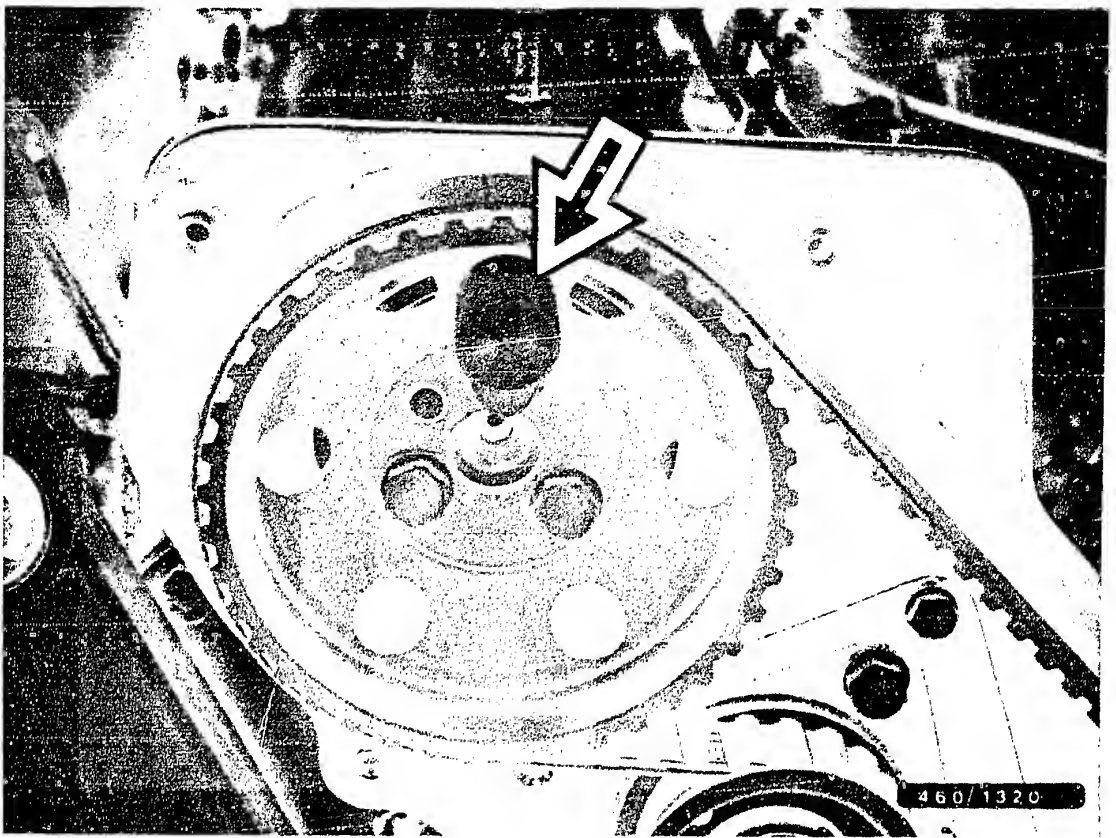
Turn the crankshaft in the direction of engine rotation, until the TDC-mark on the clutch housing aligns with the reference "PMS-1" on the flywheel.

J6

Remove fuel-injection pump

Lancia Thema 2500 Turbo-Diesel





Remove toothed-belt protection-cover fastening screws and take off protection cover.

Lock camshaft gear with locking pin (5 mm) (arrow).

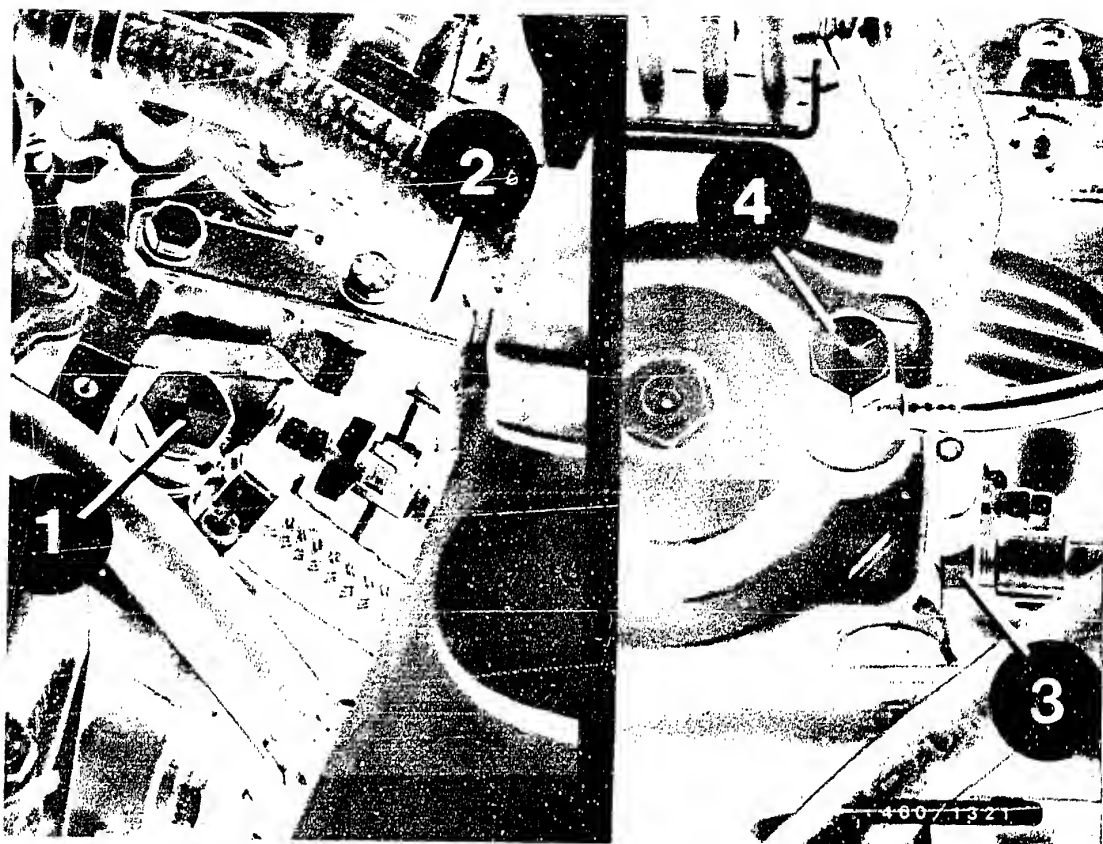
Note:

A punch or a twist drill of 5 mm diameter may be used as locking pin.

J7

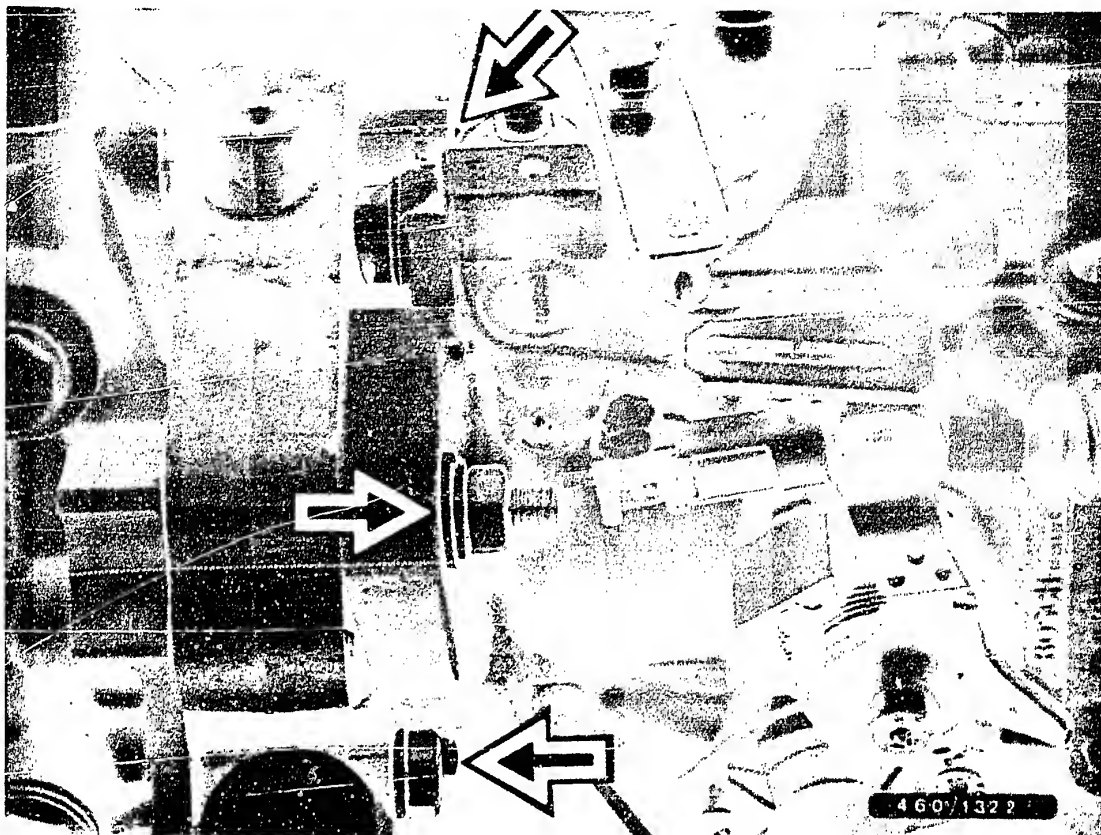
Remove fuel-injection pump
Lancia Thema 2500 Turbo-Diesel





Remove the fuel inlet line (1), the cable on the control lever (2), the fuel return line (3), and the pressure line (4) to the manifold-pressure compensator casing.

Disconnect the lead for the electrical shutoff device (not visible in the picture).



Using box wrench KDEP 1115, loosen the fuel-injection lines. (Prevent the delivery-valve holders from becoming loose by holding them with a wrench.)

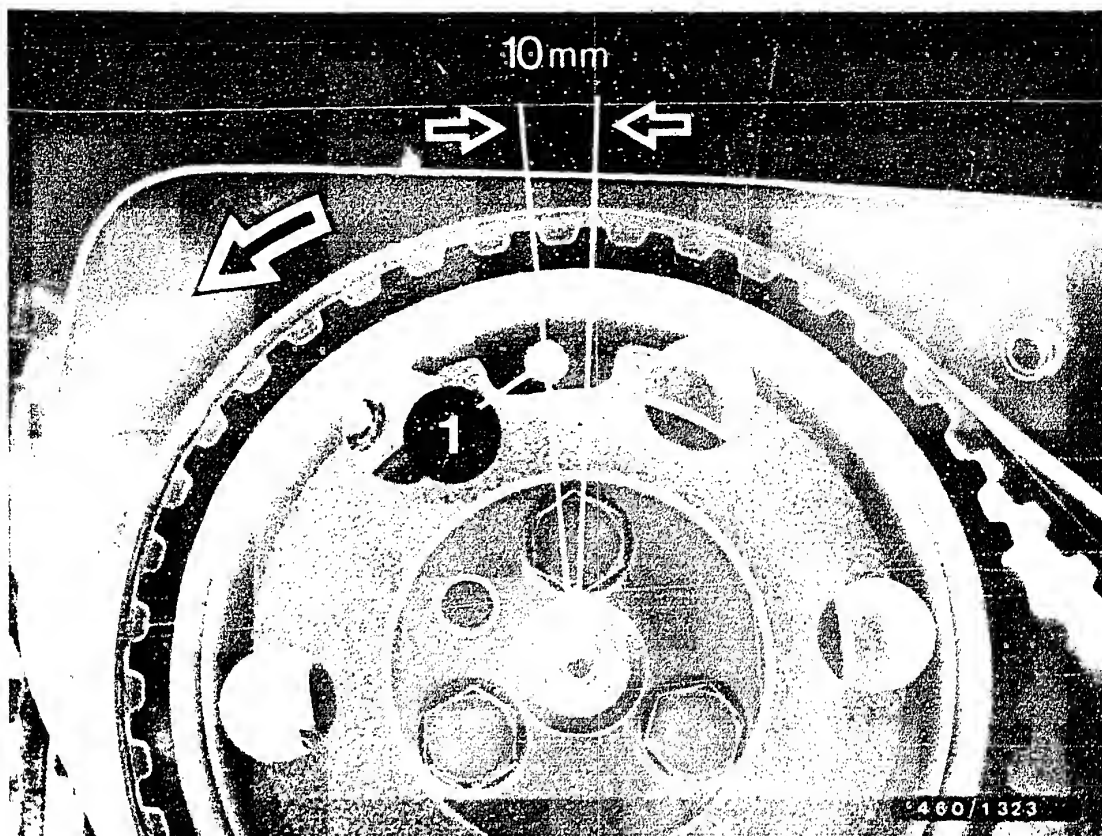
Remove fastening nuts (arrows) on the fuel-injection pump.

Remove fuel-injection pump from motor.

J9

Remove fuel-injection pump
Lancia Thema 2500 Turbo-Diesel





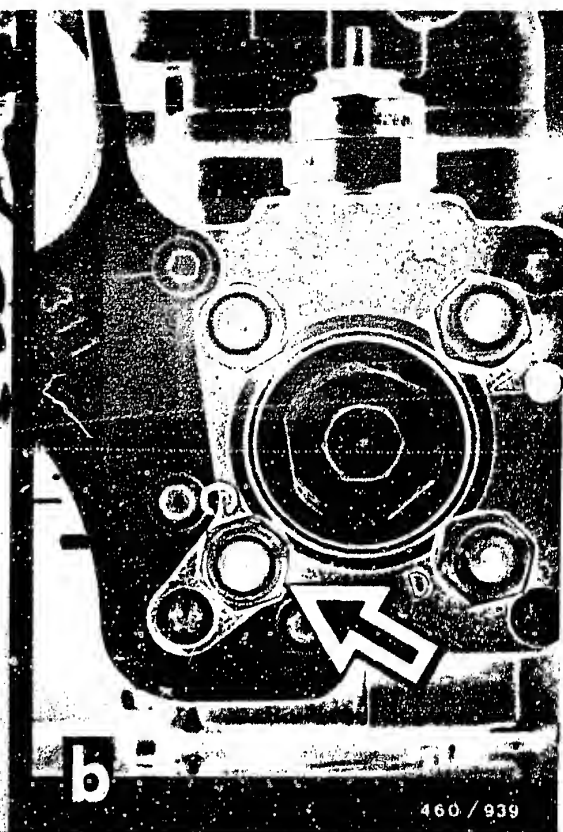
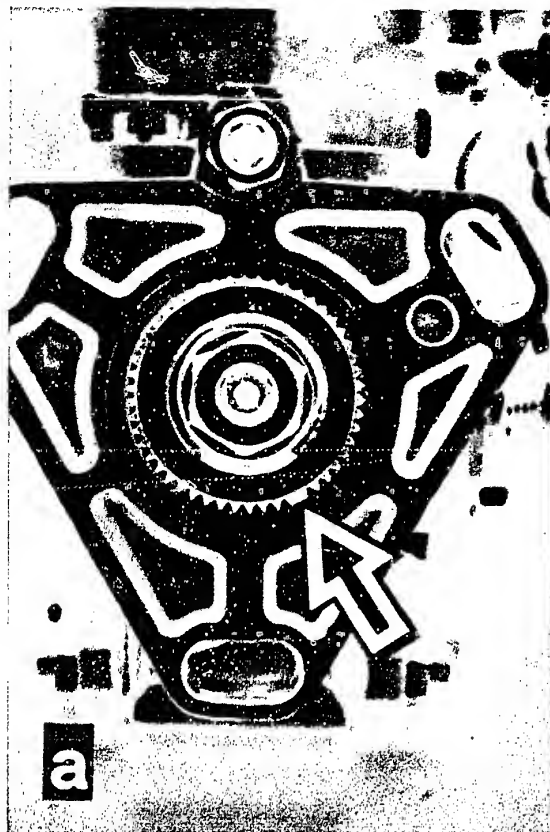
5. Install fuel-injection pump

Turn crankshaft against engine direction of rotation (direction of arrow) until locking bore on camshaft gear (1) is approx. 10 mm before locating bore (timing case).

Note:

Turning back the crankshaft makes it easier to insert the injection pump into the drive toothed sleeve.





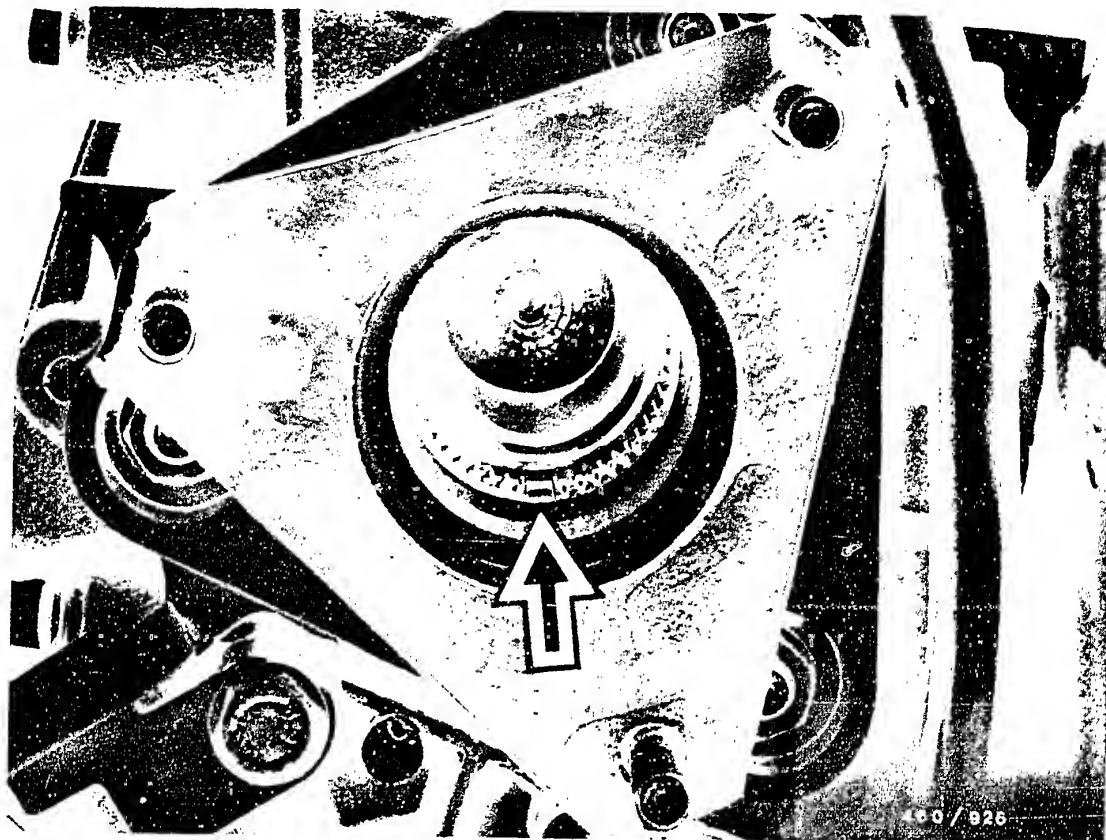
Before inserting the fuel-injection pump into the timing case, align the mark on the drive gear (illustration a-arrow) with outlet "C" (illustration b-arrow).

J11

Install fuel-injection pump

Lancia Thema 2500 Turbo-Diesel





Place fuel-injection pump on the engine, introducing the mark on the fuel-injection pump gear at the missing tooth on the drive shaft (arrow).

Pivot the fuel-injection pump into the middle position in the slots.

Screw on the fastening nuts and finger-tighten them.

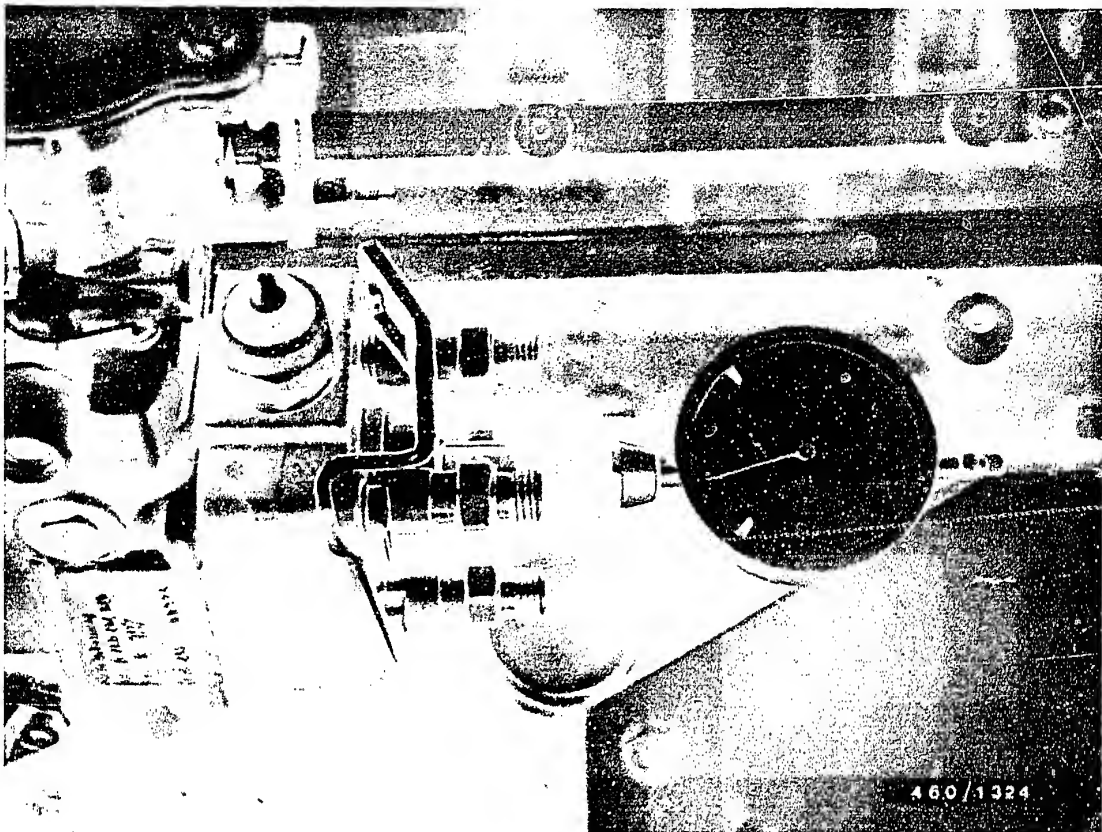
Turn the crankshaft in the direction of engine rotation, until the TDC-mark on the clutch housing aligns with the reference mark "PMS-1" on the flywheel.

J12

Install fuel-injection pump

Lancia Thema 2500 Turbo-Diesel





Unscrew the bleeder screw from the central screw plug (triangular-head plug) on the hydraulic head.

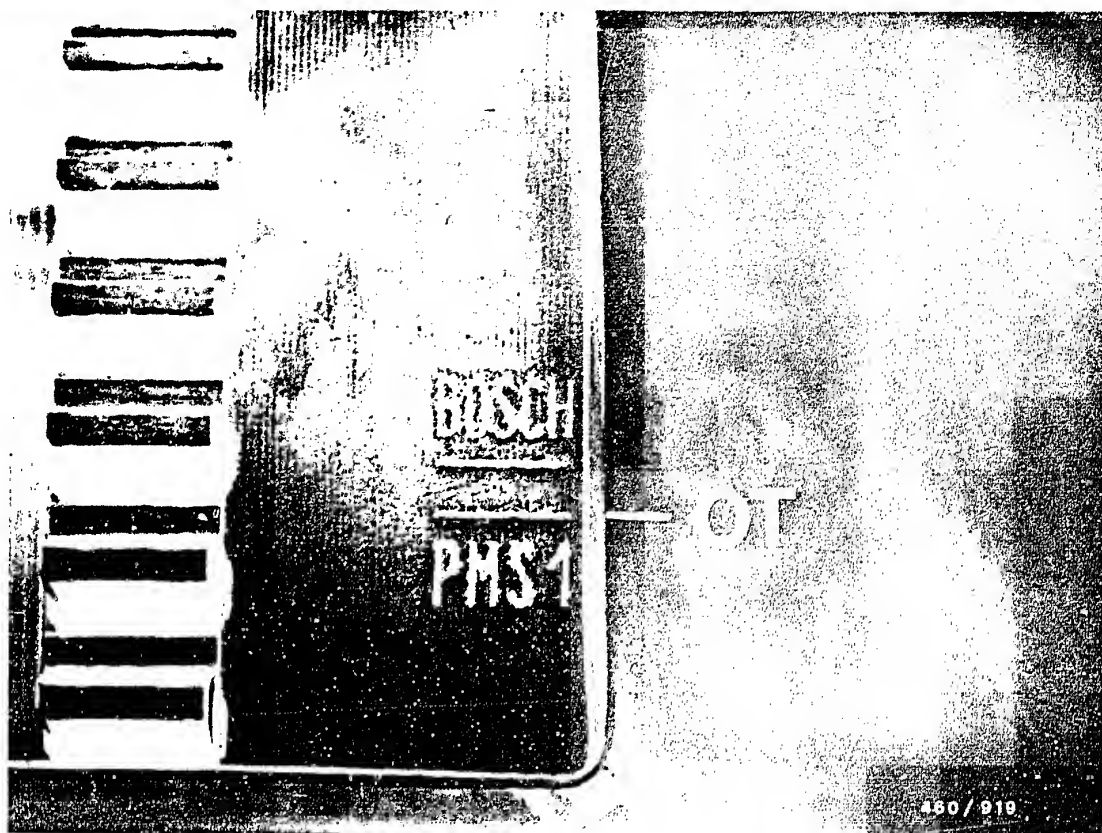
Mount measuring tool KDEP 1085 and the dial indicator in the threaded hole.

Preload the dial indicator by approx. 3 mm .

Slowly turn the crankshaft counter to the direction of engine rotation, until the needle on the dial indicator no longer moves.

Set the dial indicator at "0".





Turn crankshaft in direction of rotation until TDC mark on clutch housing aligns with reference mark "PMS-1" on flywheel (see picture).

In this position, the dial indicator must indicate a pump plunger stroke of 0.90 mm after BDC.

If a correction is necessary, loosen injection-pump fastening screws and pivot pump.

Tighten fastening screws to 25 Nm.

Turn crankshaft over twice and check adjustment again.

Remove measuring tool KDEP 1085 with dial indicator.

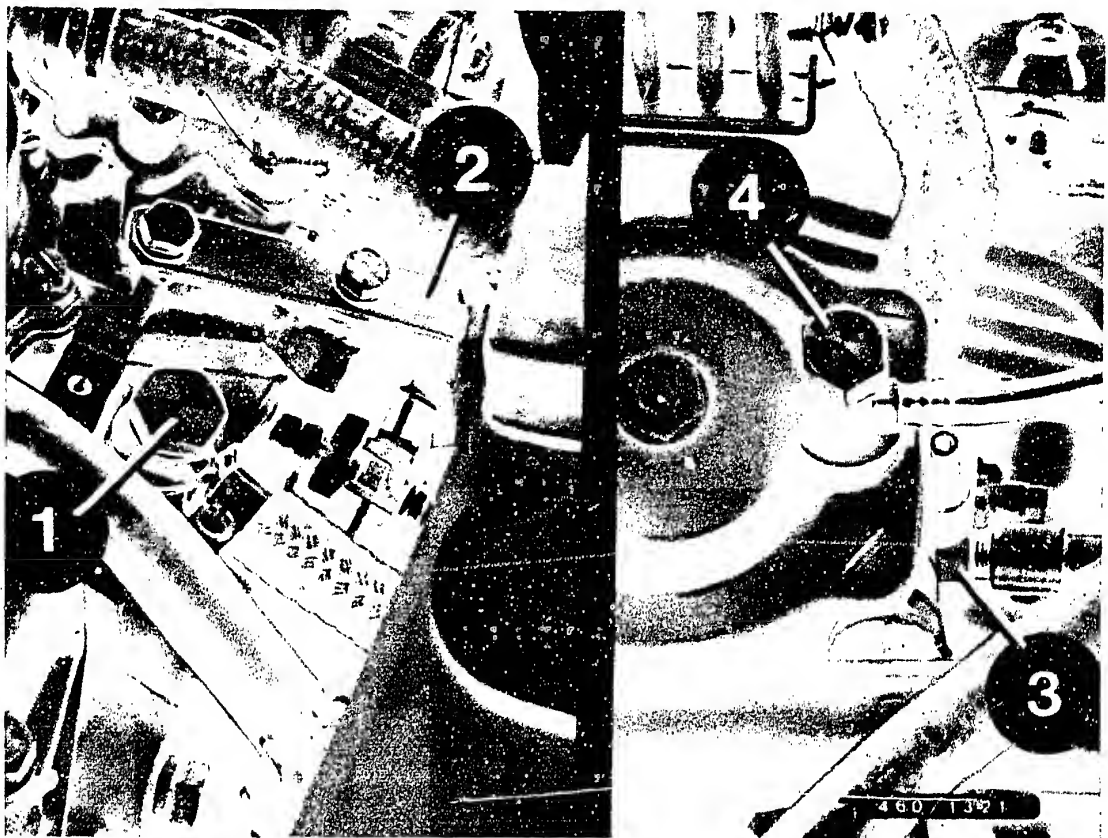
Mount bleeder screw with new seal ring.

J14

Install fuel-injection pump

Lancia Thema 2500 Turbo-Diesel





Mount fuel inlet line (1), cable on control lever (2), fuel return line (3) and delivery line (4) on manifold-pressure compensator housing.

Connect lead for electrical shutoff device.

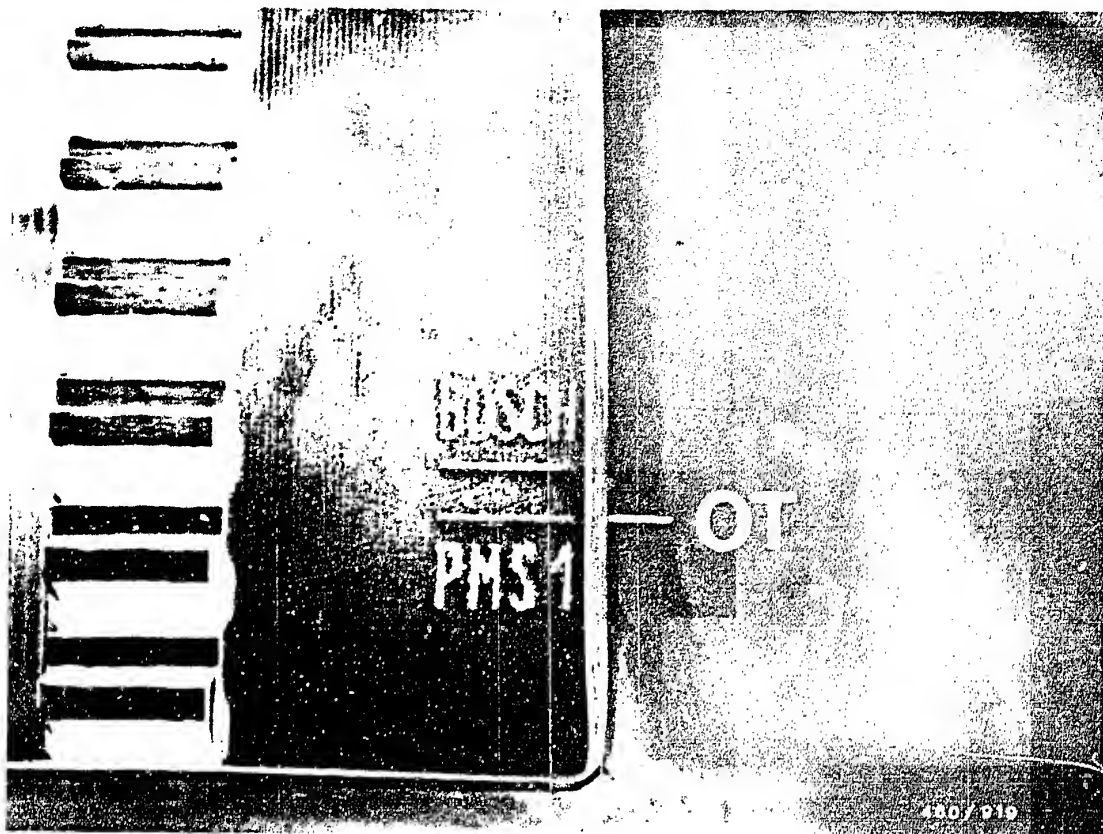
Mount injection lines.

(Prevent delivery-valve holders from turning by holding with a wrench).

Connect negative cable to battery and mount toothed-belt protection cover.

Bleed fuel system.





6. Test and adjust engine timing

6.1 Test engine timing

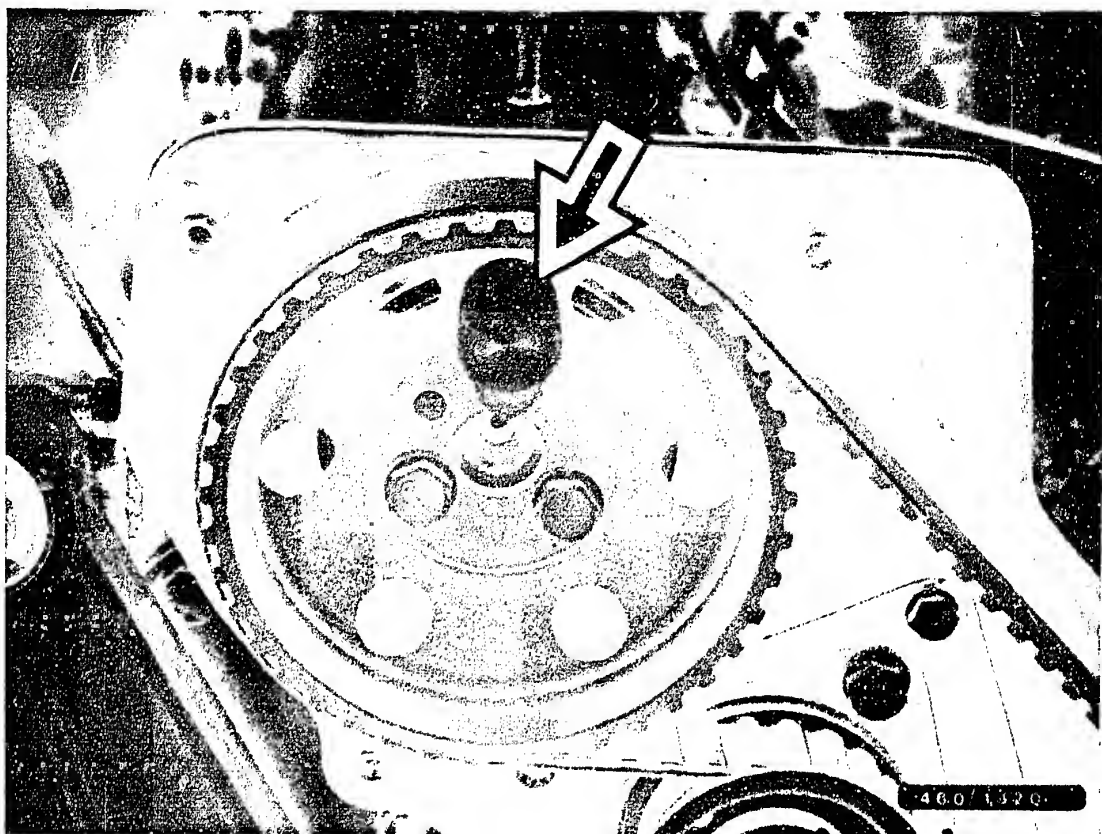
Turn the crankshaft in the direction of engine rotation until the TDC mark on the clutch housing aligns with the reference mark "PMS-1" on the flywheel.

Remove toothed-belt protection-cover fastening screws and take off protection cover.

Remove cylinder-head cover.

Cylinder 1 on compression stroke (valves of cylinder 4 on overlap).





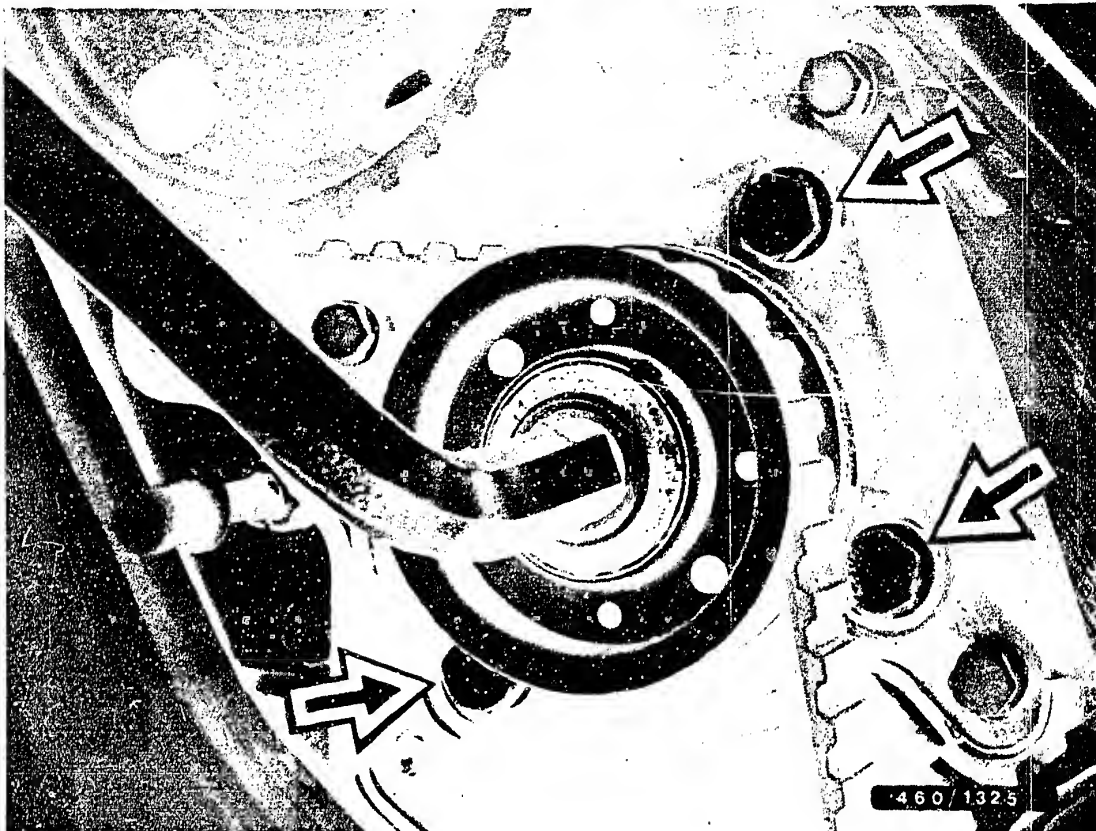
Lock camshaft gear and injection-pump drive gear with locking pins (5 mm) (see arrow).

If the locking pins cannot be introduced, correct the engine timing.

Note:

It is also possible to use punches or twist drills of 5 mm diameter as locking pins.



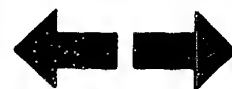


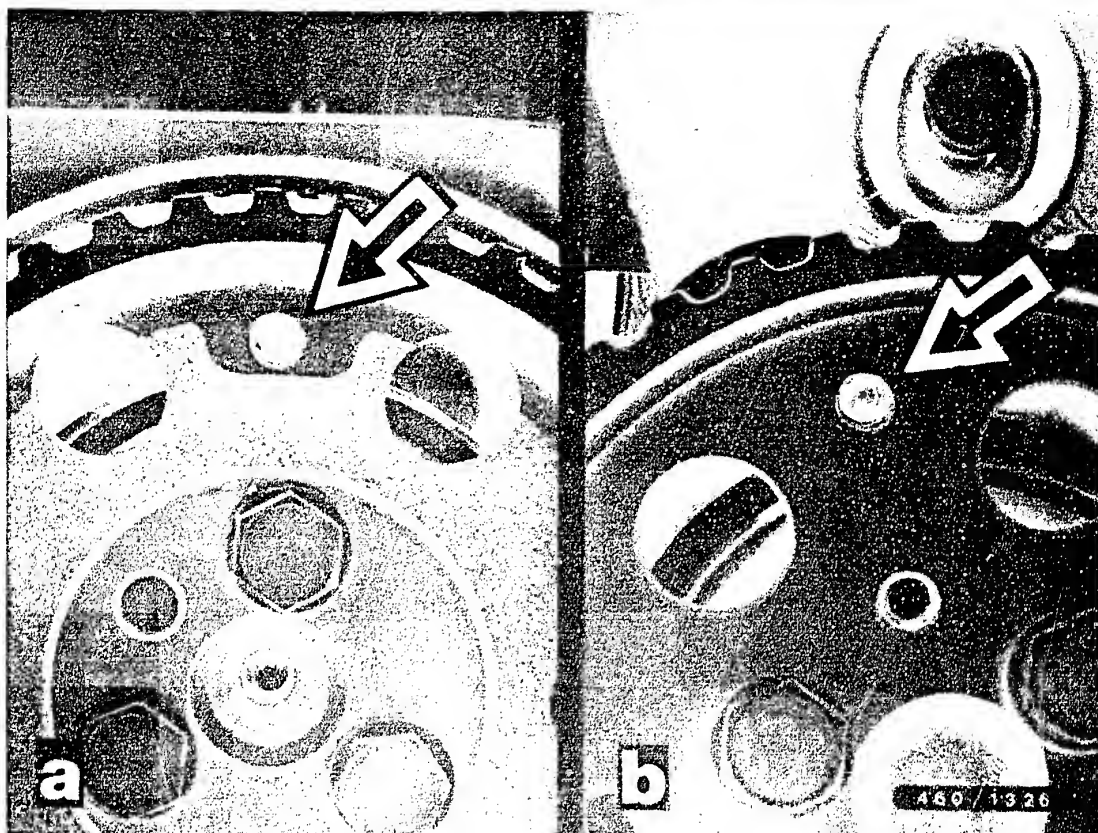
6.2 Adjust engine timing

Adjust toothed-belt tensioner locking screws (arrows).

Using 14 mm hexagon-socket-screw key (see picture), force tensioning roller as far as it will go against the spring force and re-tighten one of the fastening screws.

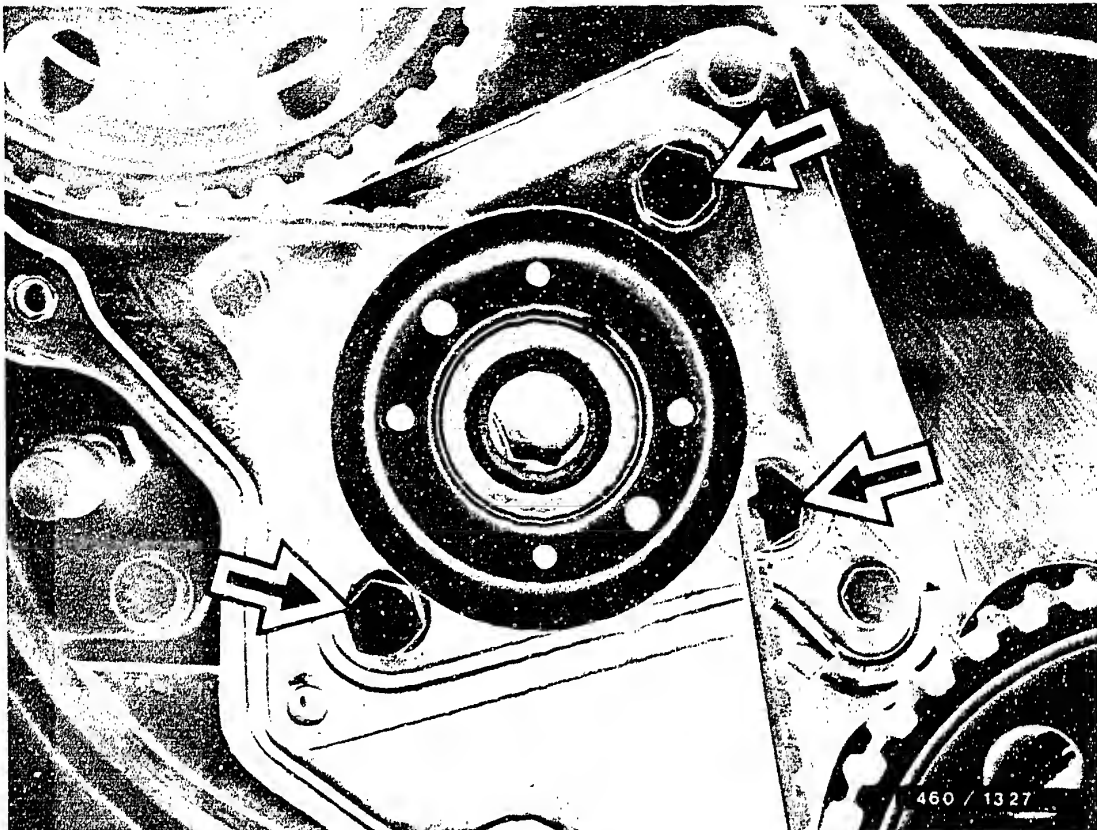
Remove toothed belt from camshaft gear and injection-pump gear.





Turn camshaft gear (picture a) and injection-pump gear (picture b) to locking bores (arrows) and locate with locking pins.

Mount toothed belt.



Loosen provisionally tightened fastening screw on toothed-belt tensioner.
Toothed belt is automatically tensioned by built-in spring.

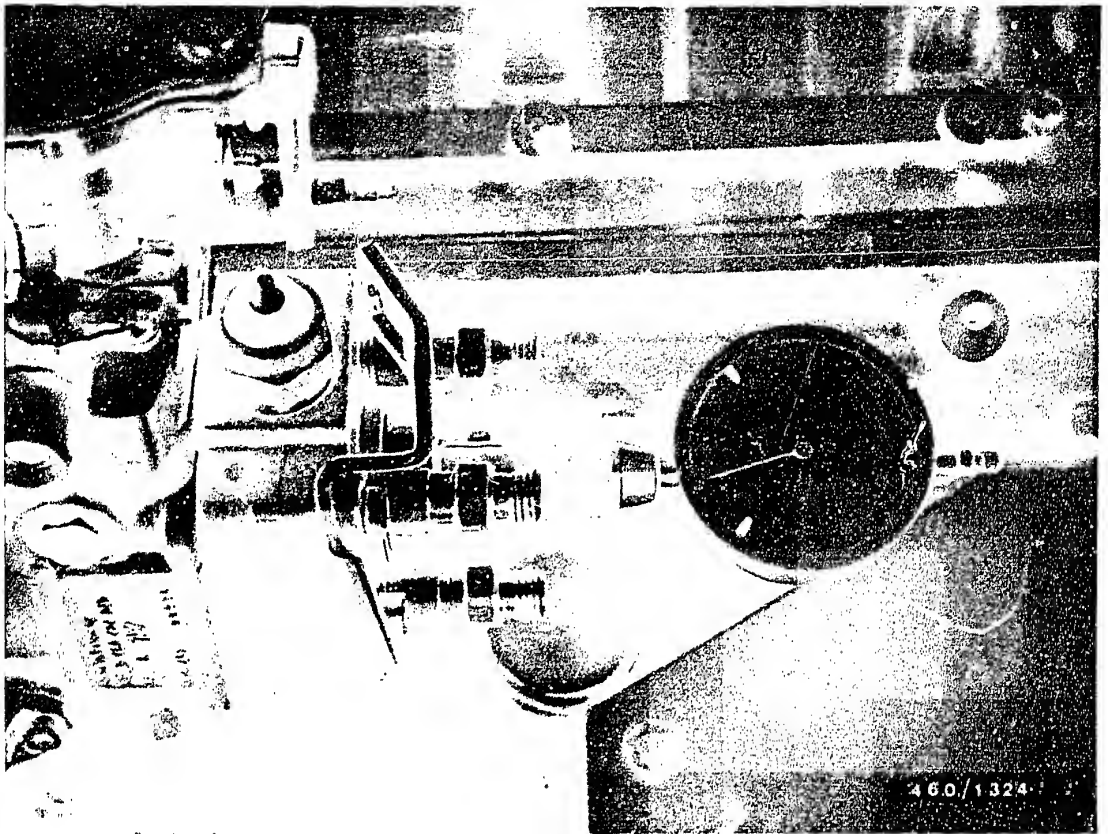
Tighten toothed-belt tensioner fastening screws (arrows).

Remove locating pins.

Turn engine crankshaft over twice in direction of rotation.

Loosen toothed-belt tensioner and re-tighten to 25 Nm.

Turn crankshaft in direction of rotation until TDC mark on clutch housing aligns with reference mark "PMS-1" on flywheel.



Remove injection lines from injection pump and nozzle holders. (Prevent delivery valves from coming loose by holding with a wrench).

Unscrew the bleeder screw from the central screw plug (triangular-head plug) on the hydraulic head.

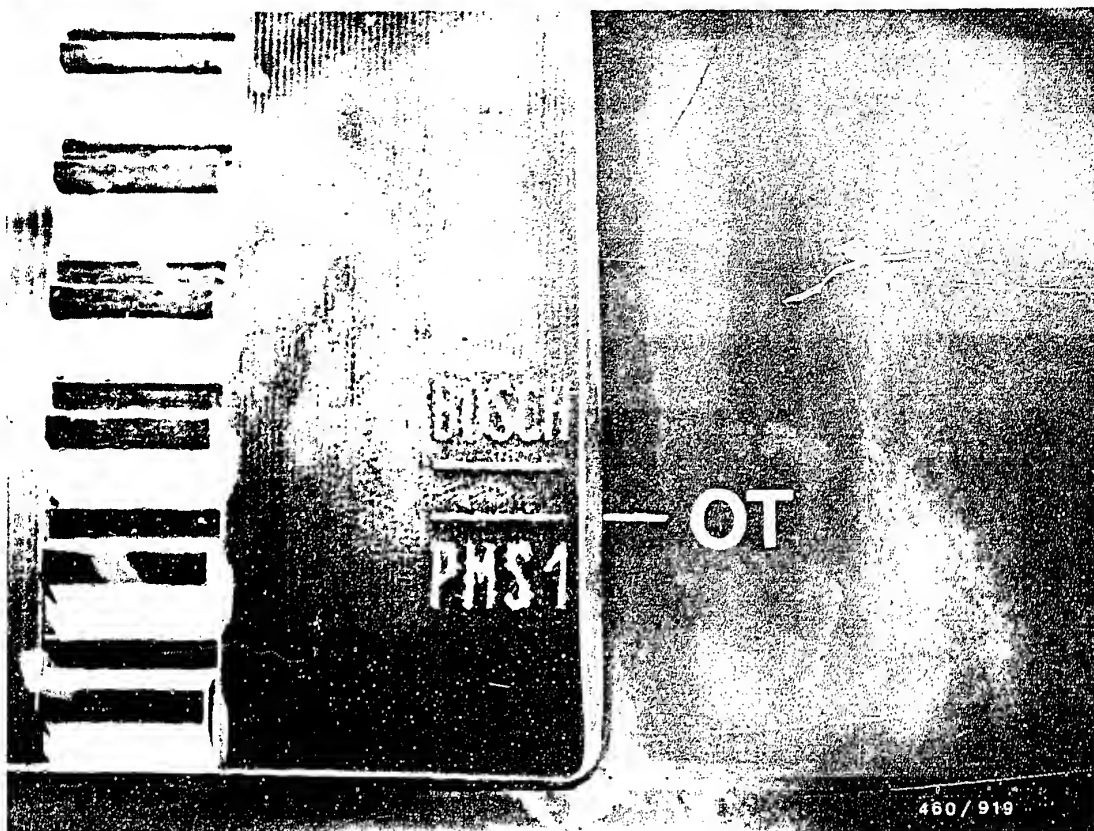
Mount measuring tool KDEP 1085 and the dial indicator in the threaded hole.

Preload the dial indicator by approx. 3 mm .

Slowly turn the crankshaft counter to the direction of engine rotation, until the needle on the dial indicator no longer moves.

Set the dial indicator at "0".





Turn crankshaft in direction of rotation until TDC mark on clutch housing aligns with reference mark "PMS-1" on flywheel (see picture).

In this position, the dial indicator must indicate a pump plunger stroke of 0.90 mm after BDC.

If a correction is necessary, loosen injection-pump fastening screws and pivot pump.

Tighten fastening screws to 25 Nm.

Turn crankshaft over twice and check adjustment again.

Remove measuring tool KDEP 1085 with dial indicator.

Mount bleeder screw with new seal ring.

Mount cylinder-head cover and toothed-belt protection cover.

Tighten injection lines with box wrench KDEP 1115.
(Prevent delivery-valve holders from turning by holding with a wrench).

Bleed fuel system.

J23

Check and adjust engine timing
Lancia Thema 2500 Turbo-Diesel



7. Check charge-air pressure

When working on the turbocharger, note that even minute particles of dirt may lead to the destruction of the turbocharger.

Therefore, never operate the engine without an air filter.

To check the charge-air pressure, it is possible to use pressure tester KDJE-P 100 or a pressure gauge 0 ... 16 bar (e.g. Wika No. 4184).

Measuring the charge-air pressure

The charge-air pressure is measured under full load, if possible on a chassis dynamometer.

Read off charge-air pressure on pressure gauge.

Set value: 0.87 bar

Note:

To evaluate the turbocharger, the following is essential: Engine at operating temperature, start of delivery and nozzle-opening pressure correctly adjusted, intake and exhaust sides not leaking, engine in good mechanical condition (valve clearance, compression pressure).

After installing a new turbocharger, fill turbocharger with oil and let engine idle for approx. 1 minute so that supply of oil to turbocharger is guaranteed.



T A B L E O F C O N T E N T S

Section

Coordinates

Special features/Rapid diagnosis chart	K 2
Test specifications	K 7
Electrical terminal diagram	K 9
Air- and fuel-supply components	K 11
Diagram of fuel lines	K 13
Fuel pressure test	K 14
Installation position of components	K 15



Special features

- LE 2 - Jetronic with 25-pin control unit
0 280 000 325, triggered from term. 1 of ignition coil.
5-pin air-flow sensor and 7-pin control relay.
Solenoid-operated injection valves with brass-wire coil.
- Cold-start control, i.e. extra fuel injected through all injection valves.
- No start valve or thermo-time switch.
- In-tank electric fuel pump
- 3-stage full-load relay.
Activated by full-load signal from control unit term.6 and by engine-speed pulses from term. 1 of ignition coil.

Note:

The LE 2 - Jetronic in the Lancia Thema is basically the same as that in the Opel 1.8 1/4-cylinder engine.

- Similar SIS repair instructions:
SIS microcard OPE-502

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER

- Universal test adapter 0 684 101 801 and
- adapter lead 1 684 463 123

The following rapid diagnosis chart makes it possible for the experienced L-Jetronic expert to quickly check the electrical part of the system with the universal test adapter.




The rapid diagnosis chart contains the following information:

- Sequence of test steps
- Position of V and Ω program switches
- Notes on how to operate the universal test adapter or other components.
- Test specifications for motortester and multimeter.



Rapid diagnosis chart for universal test adapter

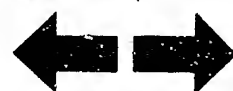
Testing of LE-2-Jetronic with adapter lead 1 684 463 123

<u>Test step</u>	<u>Switch position</u>		<u>Measurement</u>	<u>Control unit plug between terminals</u>	<u>Remarks</u>	<u>Test specifications (Reading)</u>
	V	Ω				
1	5	-	Voltage pulses from ignition coil term. 1	1 and 5	Shift gear to neutral, start	Ignition pulses on oscilloscope
2	6	-	Voltage from control relay term. 87	9 and 5	Shift gear to neutral, start	8 ... 15 V
3	7	-	Voltage from ignition/starting switch term. 50	4 and 5	Shift gear to neutral, start	8 ... 15 V
4		11	Resistance combination in air-flow sensor term. 8	8 and 5	----	100 ... 200 Ω
5		12	Resistance of potentiometer in air-flow sensor term. 7	7 and 5	Deflect sensor flap as far as it will go	60 ... 1000 Ω
6		13	Resistance of temperature sensor NTC II, term. 10 (engine temperature)	10 and 5	---	+ 15°C...+30°C: 1.45 ... 3.3 k Ω approx. +80°C: 280 ... 360 Ω

K3

Rapid diagnosis chart

Lancia 2.0 1/4 cyl. Turbo Thema



K4





Rapid diagnosis chart

Lancia 2.0 1/4 cyl. Turbo Thema



Rapid diagnosis chart for universal test adapter (continued)

Testing of LE-2-Jetronic with adapter lead 1 684 463 123

<u>Test step</u>	<u>Switch position</u>		<u>Measurement</u>	<u>Control unit plug between terminals</u>	<u>Remarks</u>	<u>Test specifications (Reading)</u>
	V	Ω				
7		14	Resistance of output stage ground term. 13	13 and 5	----	0 ... 10 Ω
8		16	Resistance of idle contact in throttle-valve switch term. 2	2 and 9	Accelerator in rest position Accelerator slightly depressed	0 ... 10 Ω $\infty \Omega$
9		17	Resistance of full-load contact in throttle-valve switch term. 3 with resistance of 3-stage full-load relay	3 and 9	Accelerator in rest position Accelerator in full-load position	$\infty \Omega$ 10 ... 15 k Ω
10		18	Resistance of all 4 parallel-connected injection valves term. 12	12 and 9	---	+20°C: 7.0 ... 9.5 Ω +80°C: 7.2 ... 10.0 Ω

K5

Rapid diagnosis chart

Lancia 2.0 1/4 cyl. Turbo Thema


K6

Rapid diagnosis chart

Lancia 2.0 1/4 cyl. Turbo Thema



TEST SPECIFICATIONS

Pressure regulator

- Fuel pressure: 2.8 ... 3.2 bar

Electric fuel pump

- Delivery at return: min. 800cm³/30s
- Terminal voltage under load: min. 12 V

Auxiliary-air device

- Electrical internal resistance 35 ... 70 Ω

Temperature sensor NTC II (Engine)

- Electrical internal resistance at ambient temperature (+15°C...+30°C): 1.45 ... 3.3 k Ω
with engine at op. temp. (approx. +80°C) 280 ... 360 Ω

Air-flow sensor

- Resistance between:
Term. 8 and term. 5: 340 ... 450 Ω
Term. 7 and term. 5: 60 ... 1000 Ω 1)
Term. 9 and term. 5: 500 ... 760 Ω
Term. 8 and term. 9: 160 ... 300 Ω

1) (Sensor flap fully deflected)

Cold-start control with NTC II connector disconnected

- Terminal voltage at an injection valve:

Drops within approx. 15 s cranking time from initially greater than 2.5 V to approx. 0.3 V .



Test specifications (continued)

Solenoid-operated injection valve

- Electrical internal resistance
at +20°C: 15.0 ... 17.5Ω

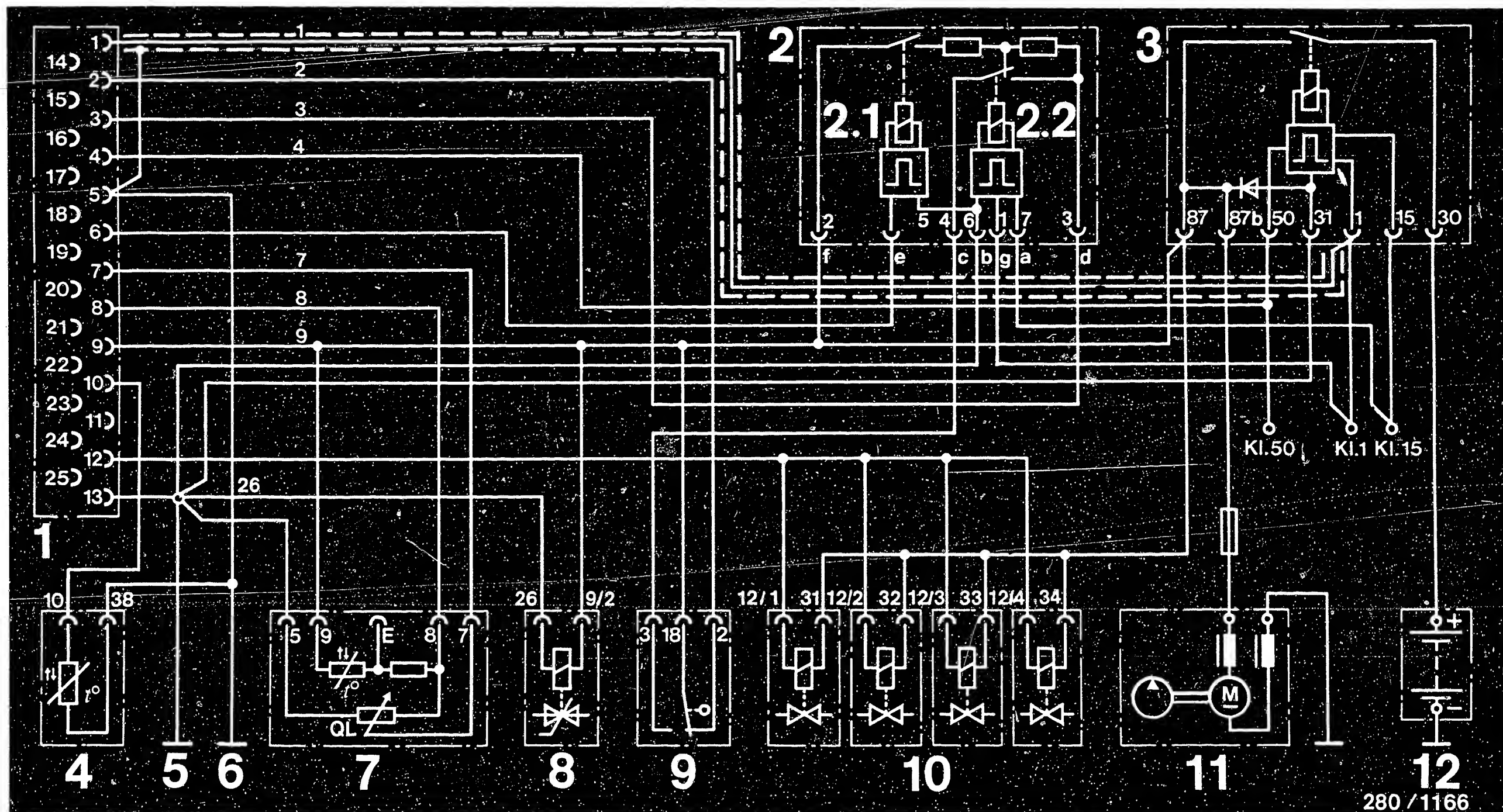
Idle adjustment engine at
normal operating temperature,
approx. +80°C, air conditioner
off.

The solenoid-operated air
valve must be leak-tight.

- Idle speed:
Europe version 850 ... 950 min⁻¹
- CO concentration: 1.5 ... 2.5 vol.%

See equipment and Autodata microcards for settings for
ignition, valve clearance and other engine data.





ELECTRICAL TERMINAL DIAGRAM

- | | | | |
|-----------------------------|--|---------------------------------|-------------------------|
| 1 = Control unit plug | 3 = Control relay | 6 = Electronics ground terminal | 10 = Injection valves |
| 2 = 3-stage full-load relay | 4 = Temperature sensor II (engine temperature) | 7 = Air-flow sensor | 11 = Electric fuel pump |
| 2.1 = Load relay | 5 = Output stage ground terminal | 8 = Auxiliary-air device | 12 = Battery |
| 2.2 = Engine-speed relay | 9 = Throttle-valve switch | | |

Re 2: Stage 1 when t_p load signal from term. 6 (w/o throttle-valve switch). Stage 2 throttle-valve switch closed only.

Stage 3 throttle-valve switch closed and engine-speed signal.

K9

Electrical terminal diagram
Lancia 2.0 1/4 cyl. Turbo Thema

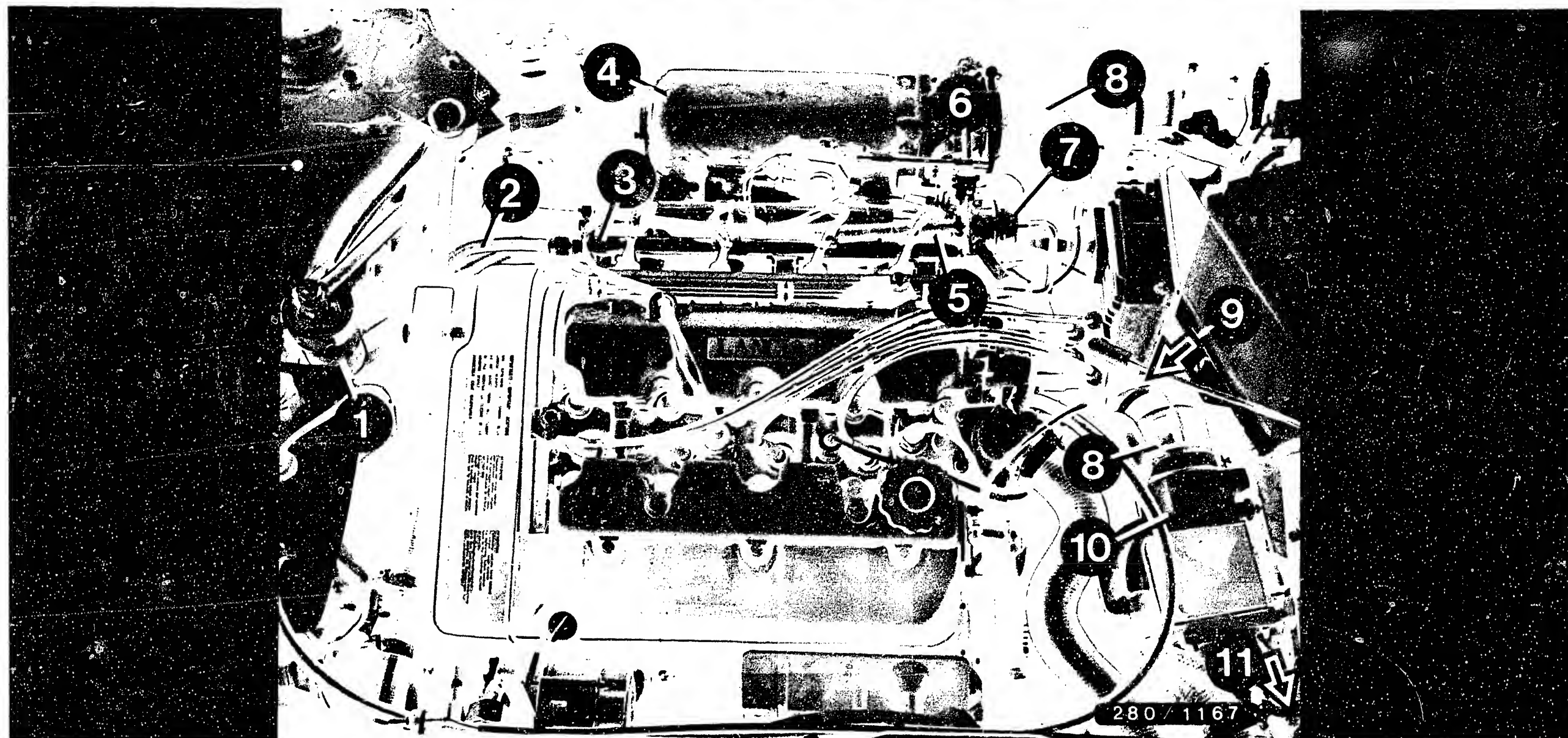


K10

Electrical terminal diagram
Lancia 2.0 1/4 cyl. Turbo Thema



280 / 1166



Air- and fuel-supply components

- 1 = Fuel filter
- 2 = Fuel inlet line
- 3 = Fuel-distribution pipe
- 4 = Intake manifold

- 5 = Return line
- 6 = Throttle-valve assembly
- 7 = Pressure regulator
- 8 = Air-guide hose

- 9 = to turbocharger
- 10 = Air-flow sensor
- 11 = to air filter

K11

Air/Fuel-supply components
Lancia 2.0 1/4 cyl. Turbo Thema



K12

Air/Fuel-supply components
Lancia 2.0 1/4 cyl. Turbo Thema



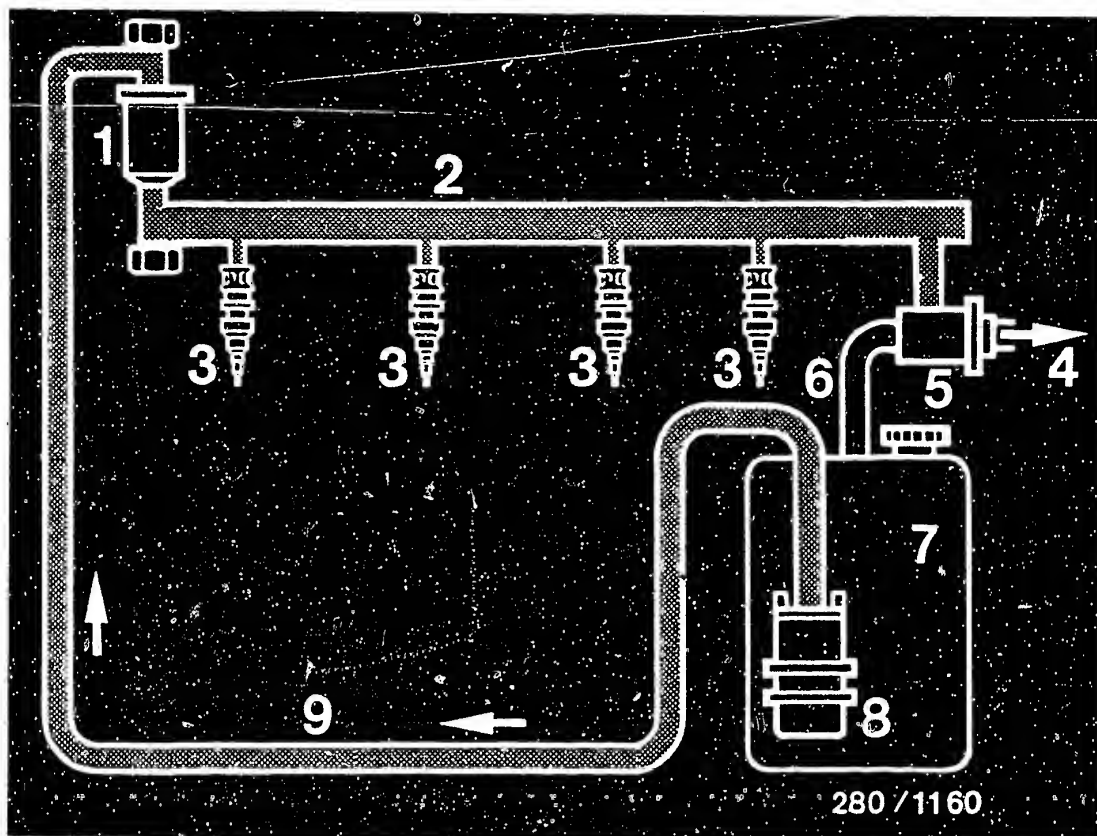


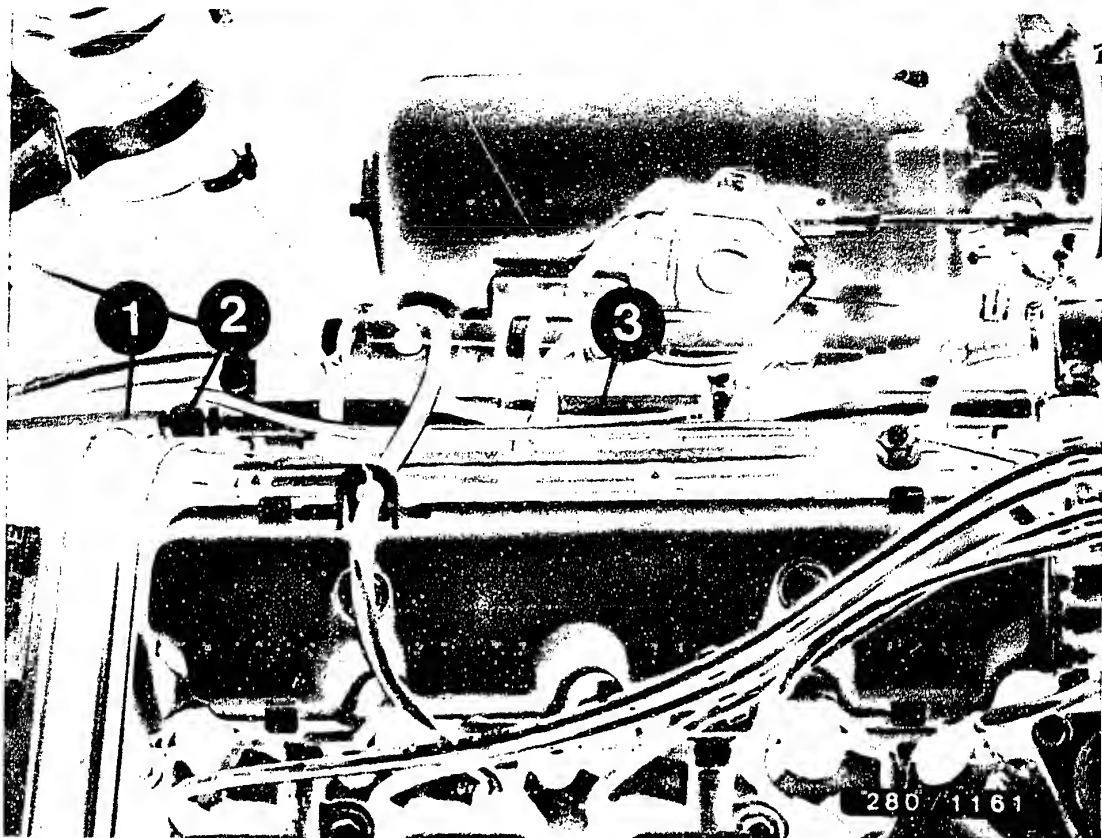
DIAGRAM OF FUEL LINES

===== pressureless

===== Fuel pressure

- 1 = Fuel filter
- 2 = Fuel-distribution pipe
- 3 = Solenoid-operated injection valves
- 4 = Intake-manifold-pressure connection
- 5 = Pressure regulator
- 6 = Return line
- 7 = Fuel tank
- 8 = In-tank electric fuel pump
- 9 = Delivery line





- 1 = Delivery line inlet
- 2 = Screw connector
- 3 = Fuel-distribution pipe

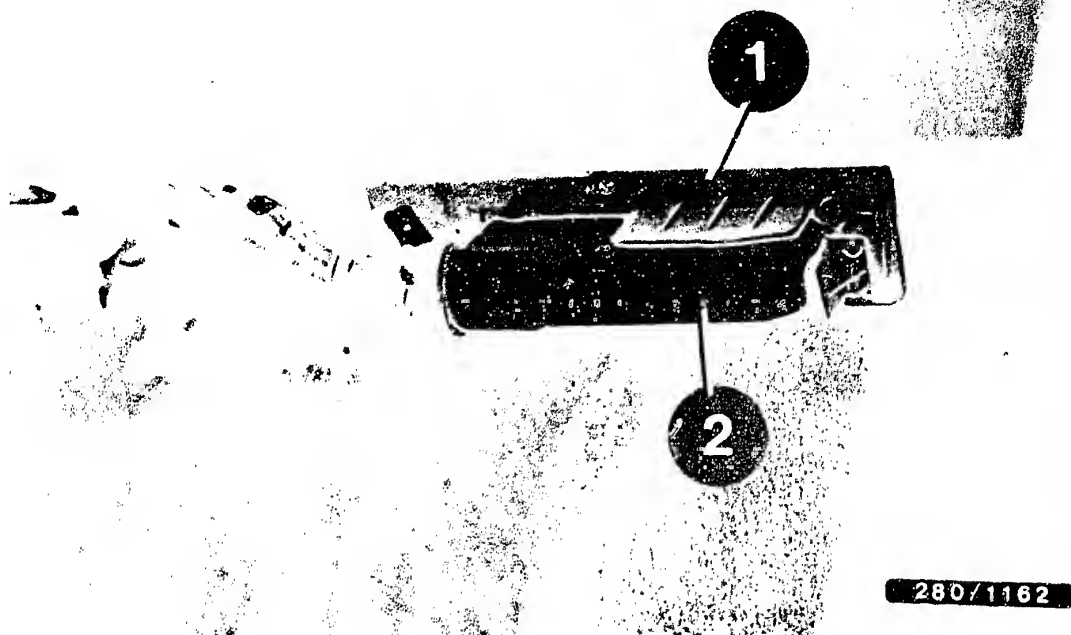
FUEL PRESSURE TEST

For the pressure test, use pressure gauge and hose line of pressure tester KDJE-P 100.

Caution: When opening the screw connector, make sure that no fuel gets onto hot parts of the engine.

Connect connecting part KDJE-P100/14 inbetween at fuel-distribution pipe inlet and connect hose line with pressure gauge to lateral threaded fitting.





- 1 = Control unit
2 = 25-pin control unit plug

Installation position of components

● Control unit in passenger compartment

All indications "left" and "right" apply always as viewed in the forward direction of travel.

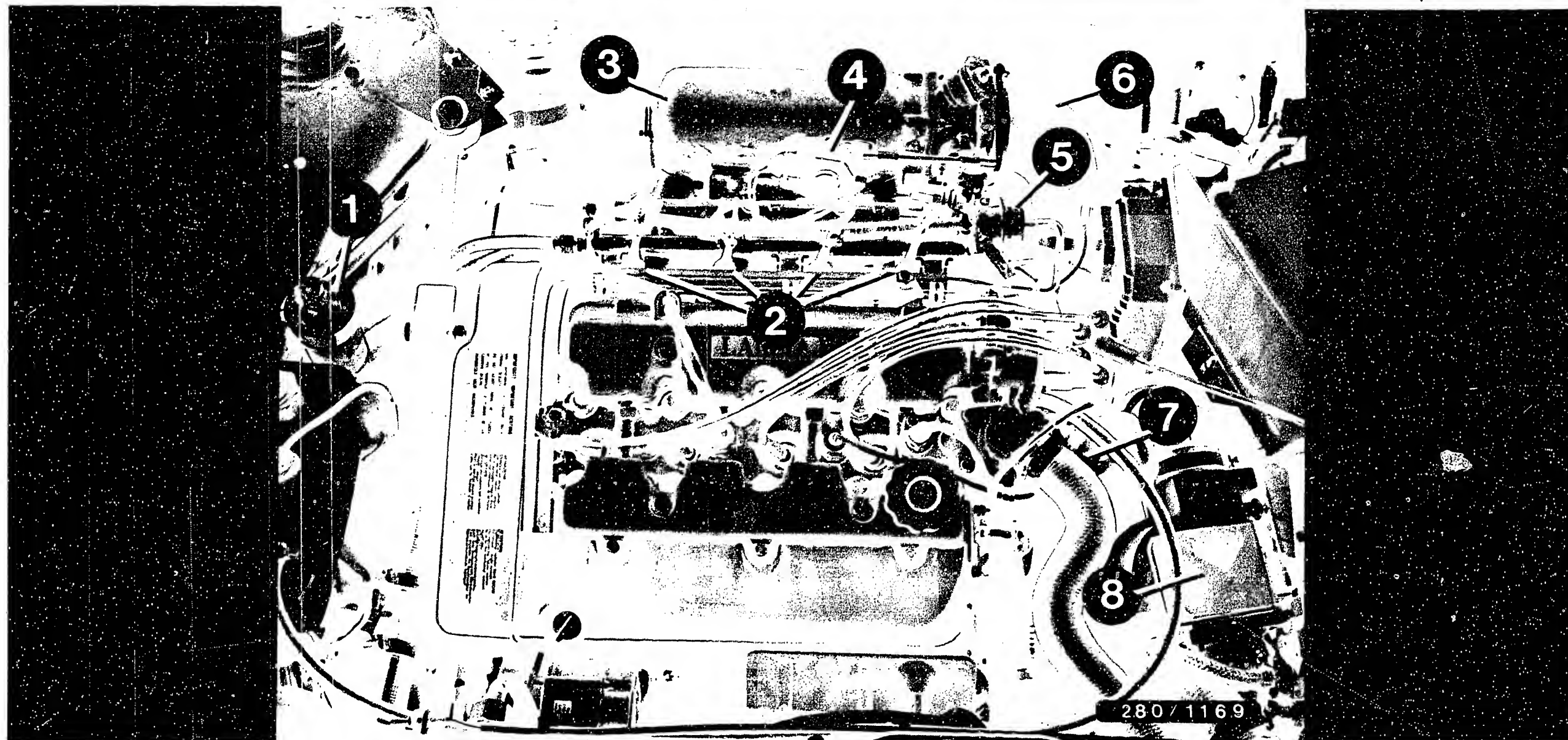
The control unit is in the passenger compartment under the glove compartment.

For the electrical test, connect universal test adapter with 25-pin adapter lead to control unit plug.

K15

Installation position of components
Lancia 2.0 1/4 cyl. Turbo Thema





• Arrangement of components on engine

1 = Fuel filter
2 = Solenoid-operated injection valves
with O-ring seals

3 = Intake manifold
4 = Throttle-valve switch
5 = Pressure regulator

6 = Air guide
7 = Auxiliary-air device
9 = Air-flow sensor

K16

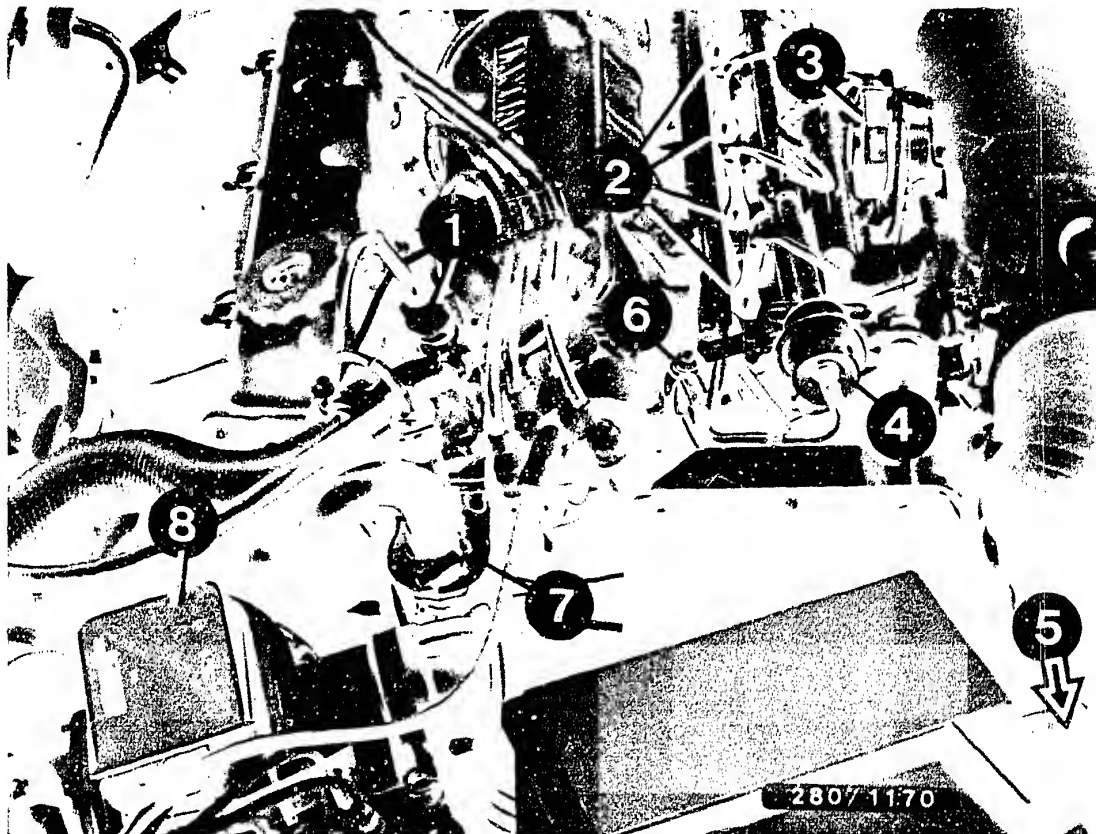
Installation position of components
Lancia 2.0 1/4 cyl. Turbo Thema



K17

Installation position of components
Lancia 2.0 1/4 cyl. Turbo Thema





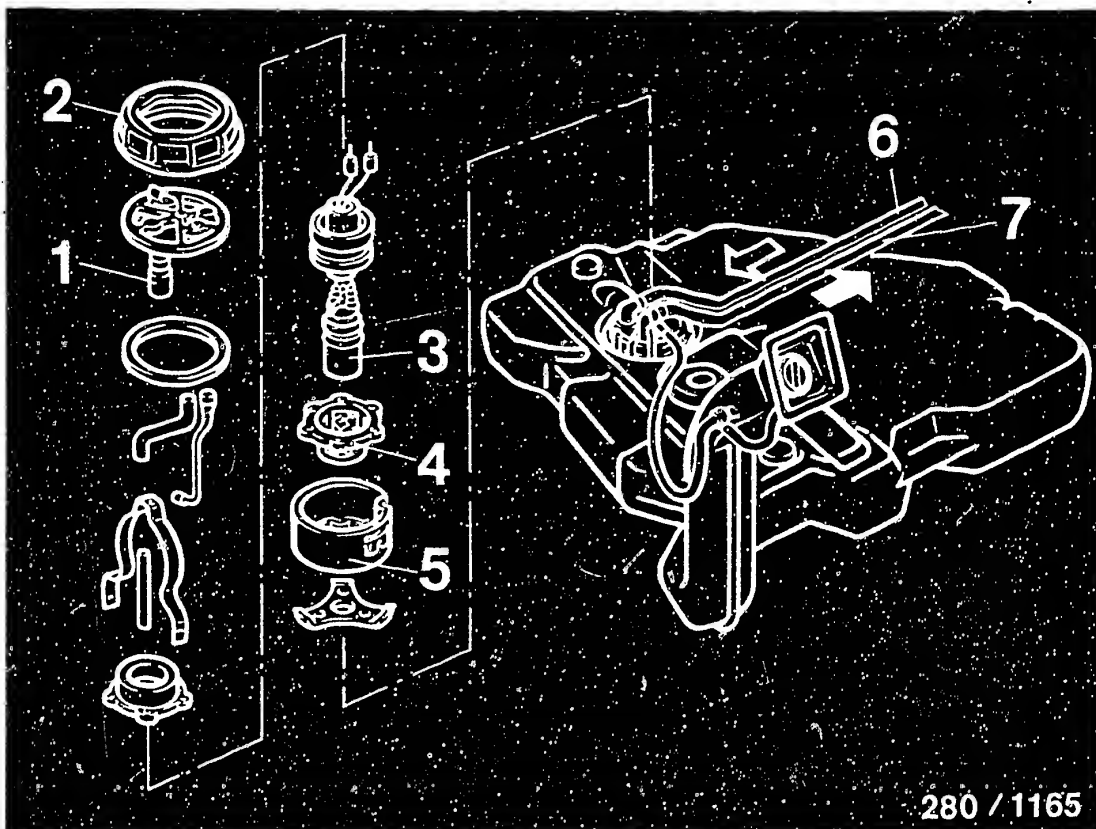
- 1 = Temperature sensor
- 2 = Injection valves
- 3 = Throttle-valve switch
- 4 = Pressure regulator
- 5 = to control relay, mounted on rear battery bracket
- 6 = Ground terminal
- 7 = Auxiliary-air device
- 8 = Air-flow sensor

K18

Installation position of components

Lancia 2.0 1/4 cyl. Turbo Thema





280 / 1165

● Fuel-supply components

- 1 = Valve
- 2 = Closure ring
- 3 = In-tank electric fuel pump
- 4 = Fuel strainer
- 5 = Retaining ring
- 6 = Return line
- 7 = Delivery line inlet

K19

Installation position of components
Lancia 2.0 1/4 cyl. Turbo Thema



T A B L E O F C O N T E N T S

Section

Coordinates

Special features/rapid diagnosis chart.....	L 2
Test specifications.....	L 7
Electrical terminal diagram.....	L 9
Air- and fuel-supply components.....	L 11
Diagram of fuel lines.....	L 13
Fuel pressure test.....	L 14
Installation position of components.....	L 15



Special features

- LE 2 - Jetronic with 25-pin control unit 0 280 000 324, triggered from term. 1 of ignition coil. 5-pin air-flow sensor and 7-pin control relay, solenoid-operated injection valves with brass-wire coil.
- Cold-start control, i.e. extra fuel injected through all injection valves.
- No start valve or thermo-time switch.
- In-tank electric fuel pump.

Note:

- The LE 2 - Jetronic in the Lancia Thema is basically the same as that in the Opel 1.8 l/4-cylinder engine.
- Similar SIS repair instructions:
SIS microcard OPE-502

RAPID DIAGNOSIS CHART FOR UNIVERSAL TEST ADAPTER

- Universal test adapter 0 684 101 801 and
- adapter lead 1 684 463 123

The following rapid diagnosis chart makes it possible for the experienced L-Jetronic expert to quickly check the electrical part of the system with the universal test adapter.

The rapid diagnosis chart contains the following information:

- Sequence of test steps
- Position of V and Ω program switches
- Notes on how to operate the universal test adapter or other components.
- Test specifications for motortester and multimeter.




L2

Special features/Rapid diagnosis
Lancia 2.0 l / 4-cyl. Thema



Rapid diagnosis chart for universal test adapter

Testing of LE-2-Jetronic with adapter lead 1 684 463 123

<u>Test step</u>	<u>Switch position</u>		<u>Measurement</u>	<u>Control-unit plug between terminals</u>	<u>Remarks</u>	<u>Test specifications (Reading)</u>
	V	Ω				
1	5	-	Voltage pulses from ignition coil term. 1	1 and 5	Shift gear to neutral, start	Ignition pulses on oscilloscope
2	6	-	Voltage from control relay term. 87	9 and 5	Shift gear to neutral, start	8 ... 15 V
3	7	-	Voltage from ignition/starting switch term. 50	4 and 5	Shift gear to neutral, start	8 ... 15 V
4		11	Resistance combination in air-flow sensor term. 8	8 and 5	----	100 ... 200 Ω
5		12	Resistance of potentiometer in air-flow sensor term. 7	7 and 5	Deflect sensor flap as far as it will go	60 ... 1000 Ω
6		13	Resistance of temperature sensor NTC II, term. 10 (engine temperature)	10 and 5	---	+15°C...+30°C: 1.45 ... 3.3 k Ω approx. + 80°C: 280 ... 360 Ω

L3

Rapid diagnosis chart

Lancia 2.0 1/4-cyl. Thema


L4





Rapid diagnosis chart

Lancia 2.0 1/4-cyl. Thema



Rapid diagnosis chart for universal test adapter (continued)

Testing of LE-2-Jetronic with adapter lead 1 684 463 123

Test step	Switch position		Measurement	Control-unit plug between terminals	Remarks	Test specifications (Reading)
	V	Ω				
7		14	Resistance of output stage ground term. 13	13 and 5	---	0 ... 10 Ω
8		16	Resistance of idle contact in throttle-valve switch term. 2	2 and 9	Accelerator in rest position Accelerator slightly depressed	0 ... 10 Ω $\infty\Omega$
9		17	Resistance of full-load contact in throttle-valve switch term. 3	3 and 9	Accelerator in rest position Accelerator in full-load position	$\infty\Omega$ 0 ... 10 Ω
10		18	Resistance of all 4 parallel-connected injection valves term. 12	12 and 9	----	+20°C: 7.0 ... 9.5 Ω +80°C: 7.2 ... 10.0 Ω

L5

Rapid diagnosis chart
Lancia 2.0 l / 4-cyl. Thema



L6

Rapid diagnosis chart
Lancia 2.0 l / 4-cyl. Thema



TEST SPECIFICATIONS

Pressure regulator

- Fuel pressure: 2.8 ... 3.2 bar

Electric fuel pump

- Delivery at return: min. 750 cm³/30s
- Terminal voltage under load: min. 12 V

Auxiliary-air device

- Electrical internal resistance 35 ... 70 Ω

Temperature sensor NTC II (Engine)

- Electrical internal resistance at ambient temperature (+15°C...+30°C): 1.45 ... 3.3 k Ω
with engine at op. temp. (approx. +80°C) 280 ... 360 Ω

Air-flow sensor

- Resistance between:
 - Term. 8 and term. 5: 340 ... 450 Ω
 - Term. 7 and term. 5: 60 ... 1000 Ω 1)
 - Term. 9 and term. 5: 500 ... 760 Ω
 - Term. 8 and term. 9: 160 ... 300 Ω

1) (Sensor flap fully deflected)

Cold-start control with NTC II connector disconnected

- Terminal voltage at an injection valve:

Drops within approx. 15 s cranking time from initially greater than 2.5 V to approx. 0.3 V.



Test specifications (continued)

Solenoid-operated injection valve

- Electrical internal resistance
at +20°C: 15.0 ... 17.5Ω

Idle adjustment engine at
normal operating temperature,
approx. +80°C, air conditioner
off.

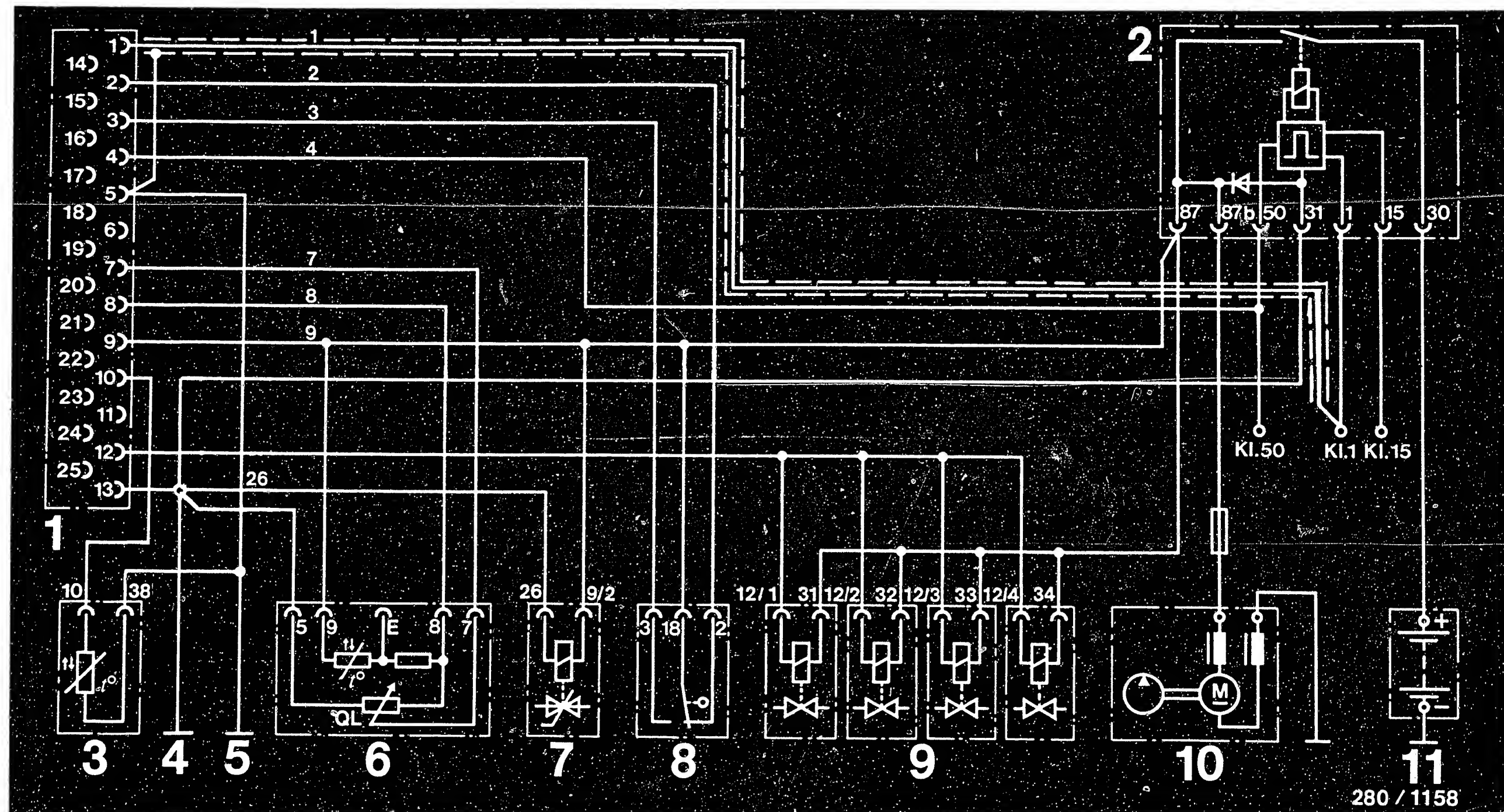
The solenoid-operated air
valve must be leak-tight.

- Idle speed:
Europe version 850 ... 950 min⁻¹

- CO concentration: 1.5 ... 2.5 vol. %

See equipment and Autodata microcards for settings for
ignition, valve clearance and other engine data.





ELECTRICAL TERMINAL DIAGRAM

1 = Control-unit plug
 1 = Control relay
 3 = Temperature sensor II
 (engine temperature)

4 = Output stage ground terminal
 5 = Electronics ground terminal
 6 = Air-flow sensor
 7 = Auxiliary-air device

8 = Throttle-valve switch
 9 = Injection valves
 10 = Electric fuel pump
 11 = Battery

L9

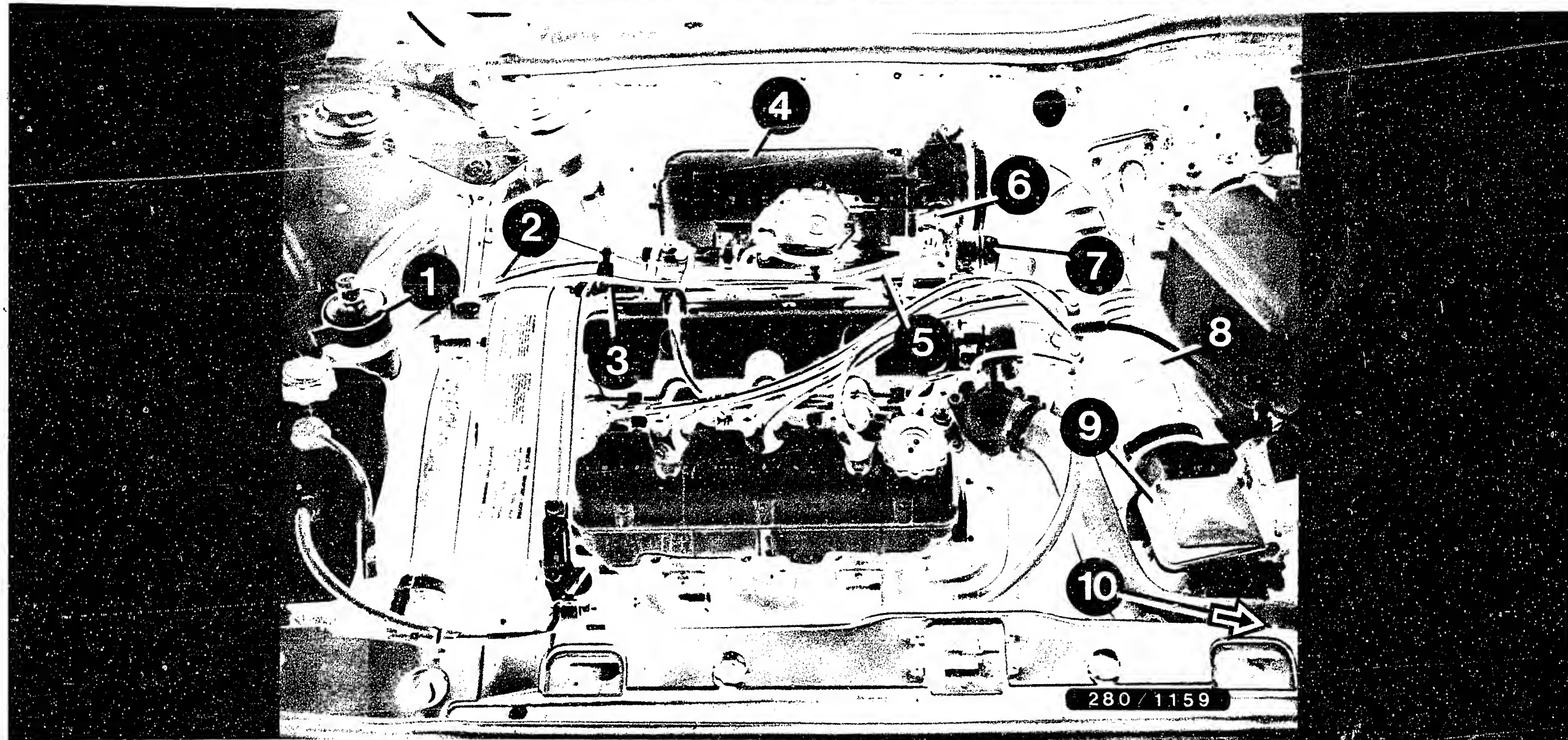
Electrical terminal diagram
 Lancia 2.0 1 / 4-cyl. Thema



L10

Electrical terminal diagram
 Lancia 2.0 1 / 4-cyl. Thema





Air- and fuel-supply components

- 1 = Fuel filter
- 2 = Fuel inlet line
- 3 = Fuel-distribution pipe
- 4 = Intake manifold

- 5 = Return line
- 6 = Throttle-valve assembly
- 7 = Pressure regulator

- 8 = Air-guide hose
- 9 = Air-flow sensor
- 10 = to air filter

L11

Air- and fuel-supply components
Lancia 2.0 1 / 4-cyl. Thema



L12

Air- and fuel-supply components
Lancia 2.0 1 / 4-cyl. Thema



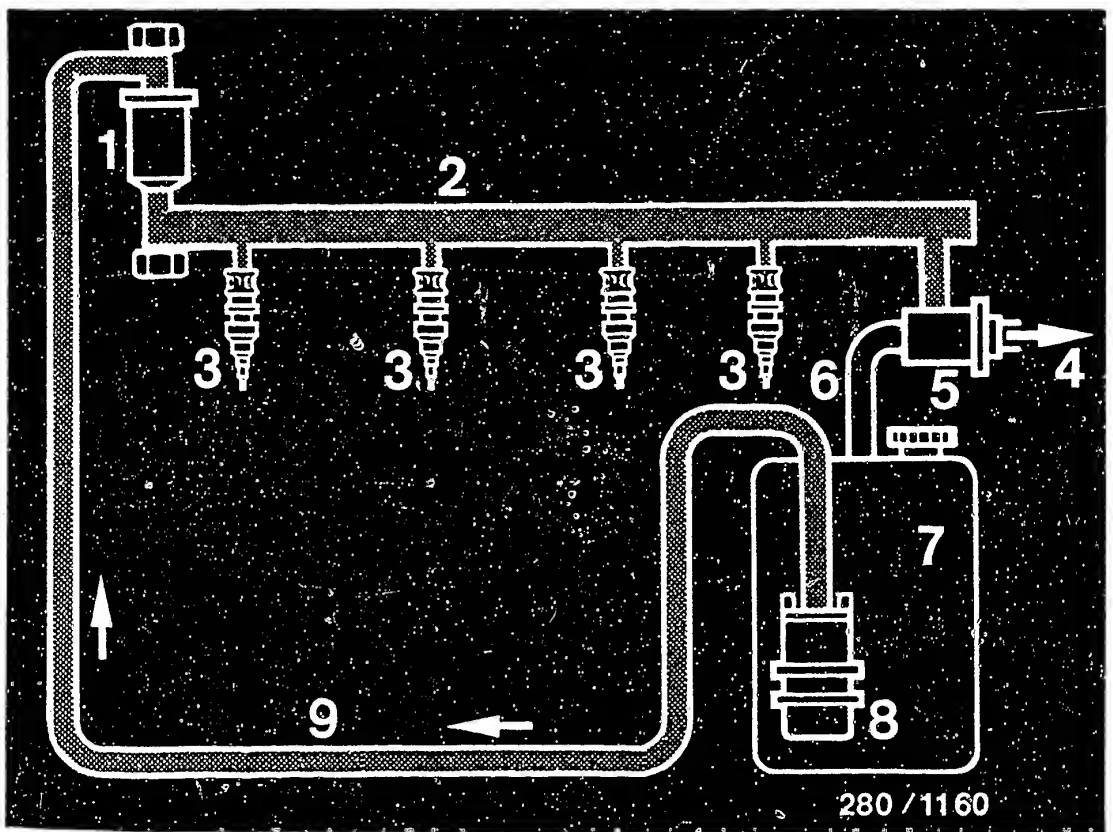
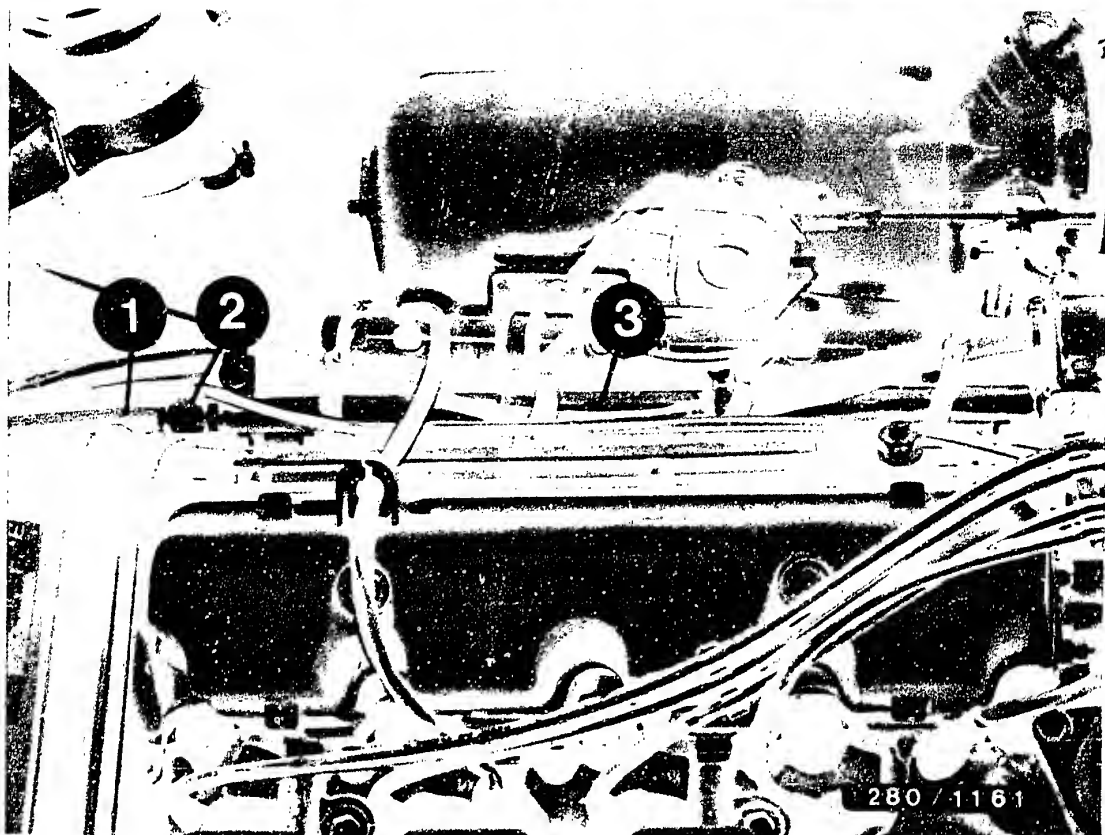


DIAGRAM OF FUEL LINES

————— Pressureless
 ————— Fuel pressure

- 1 = Fuel filter
- 2 = Fuel-distribution pipe
- 3 = Solenoid-operated injection valves
- 4 = Intake-manifold pressure connection
- 5 = Pressure regulator
- 6 = Return line
- 7 = Fuel tank
- 8 = In-tank electric fuel pump
- 9 = Delivery line





- 1 = Delivery line inlet
- 2 = Screw connector
- 3 = Fuel-distribution pipe

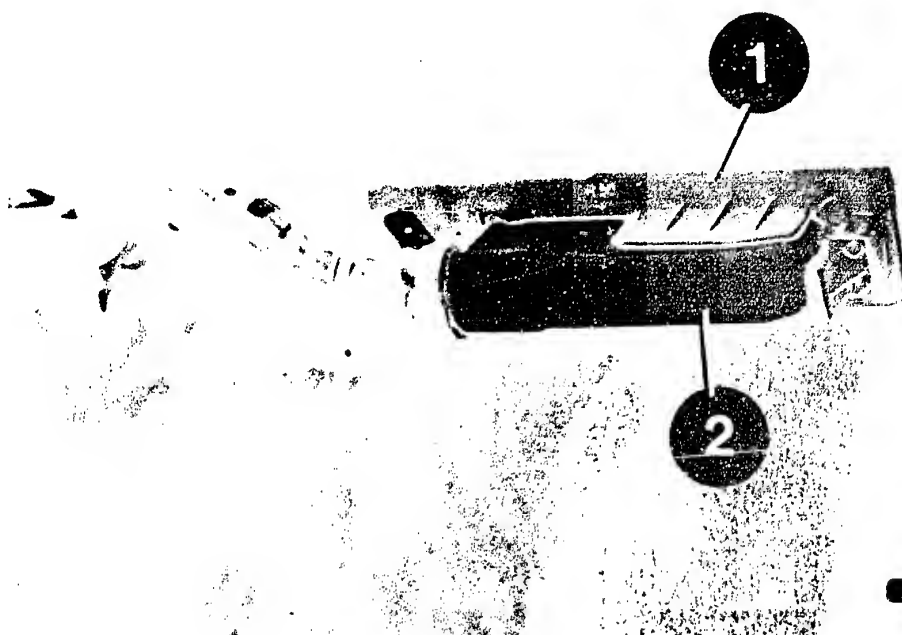
FUEL PRESSURE TEST

For testing the pressure, use pressure gauge and hose line of pressure tester KDJE-P 100.

Caution: When opening the screw connector, make sure that no fuel gets onto hot parts of the engine.

Connect connecting part KDJE-P100/14 inbetween at the fuel-distribution pipe inlet and connect hose line with pressure gauge to lateral threaded fitting.





280/1162

- 1 = Control unit
- 2 = 25-pin control-unit plug

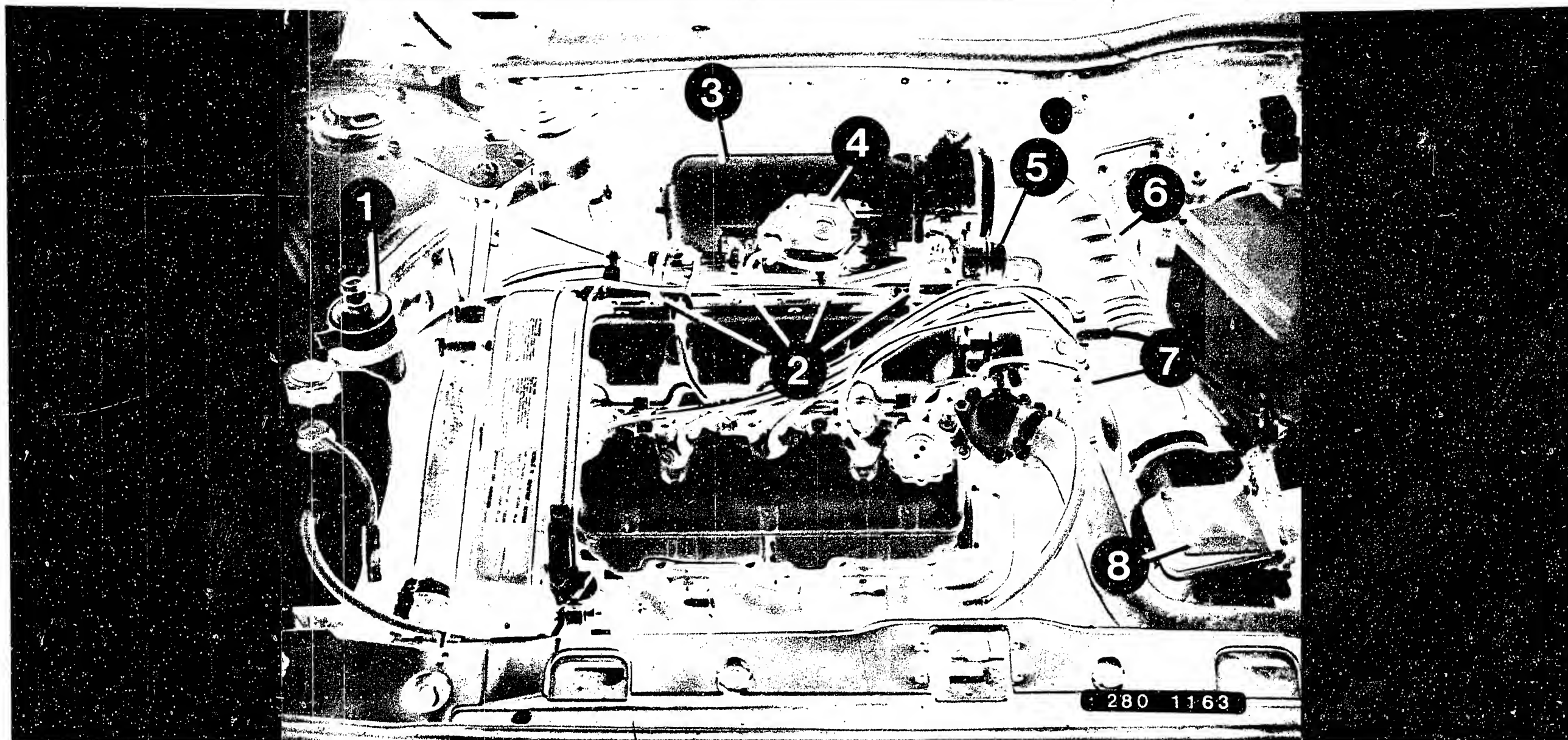
Installation position of components

- Control unit in passenger compartment
The indications "left" and "right" apply always
as viewed in the forward direction of travel.

The control unit is in the passenger compartment under the glove compartment.

For electrical testing, connect universal test adapter with 25-pin adapter lead to control-unit plug.





● Arrangement of components on engine

1 = Fuel filter
2 = Solenoid-operated injection valves
with O-ring seals

3 = Intake manifold
4 = Throttle-valve switch
5 = Pressure regulator

6 = Air guide
7 = Auxiliary-air device
9 = Air-flow sensor

L16

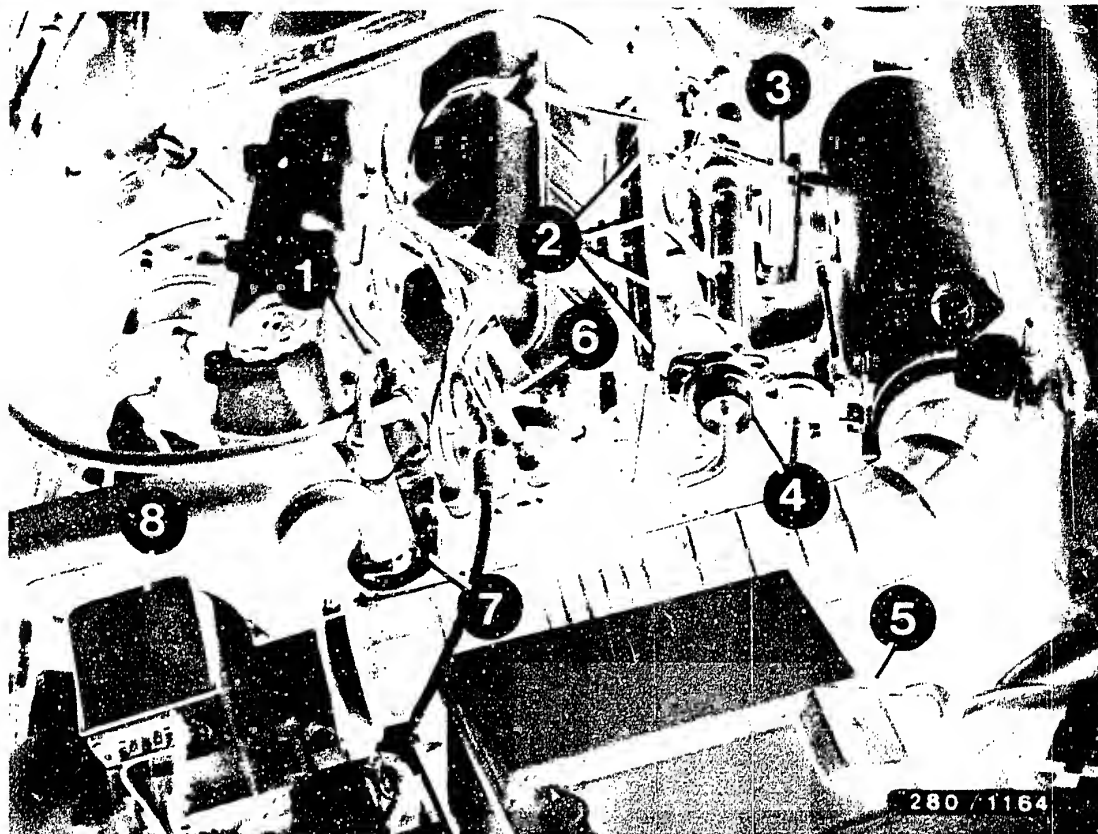
Installation position of components
Lancia 2.0 1 / 4-cyl. Thema



L17

Installation position of components
Lancia 2.0 1 / 4-cyl. Thema



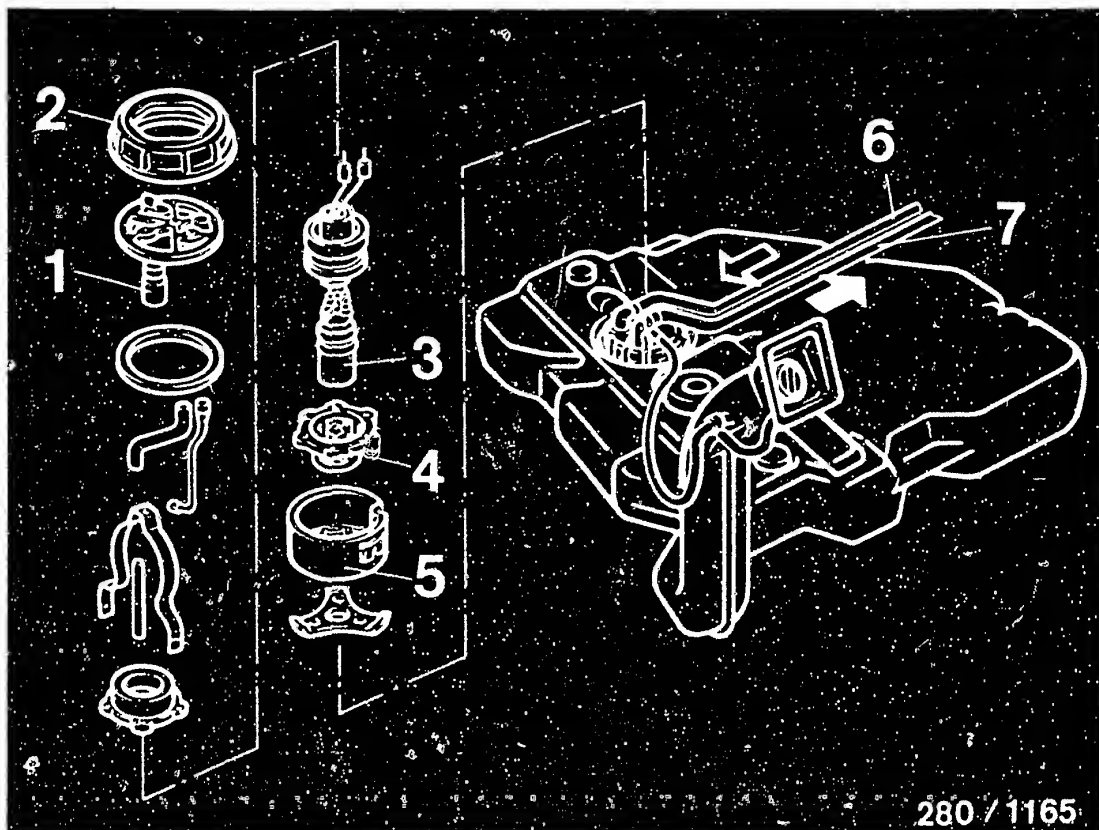


- 1 = Temperature sensor
- 2 = Solenoid-operated injection valves
- 3 = Throttle-valve switch
- 4 = Pressure regulator
- 5 = to control relay, mounted on rear battery bracket
- 6 = Ground terminal
- 7 = Auxiliary-air device
- 8 = Air-flow sensor

L18

Installation position of components
Lancia 2.0 l / 4-cyl. Thema





280 / 1165

● Fuel-supply components

- 1 = Valve
- 2 = Closure ring
- 3 = In-tank electric fuel pump
- 4 = Fuel strainer
- 5 = Retaining ring
- 6 = Return line
- 7 = Delivery line inlet

L19

Installation position of components

Lancia 2.0 1 / 4-cyl. Thema



Table of Contents

<u>Section</u>	<u>Coordinate</u>
1. Rapid diagnosis chart	M 2
2. General information	M 5
3. Test specifications	M 6
4. Diagram of lines and position of components	M 7
5. Electrical circuit diagram	M 8
6. Testers and tools	M 9
7. Testing and trouble-shooting	M 10
7.1 Electrical tests	M 10
7.2 Functional test	M 12



1. Rapid diagnosis chart

The following diagnosis chart makes it possible for the experienced expert to quickly check the retrofitted overrun cutoff using standard workshop test equipment.

The rapid diagnosis chart contains the following:

- customer complaint
- cause of the trouble
- remedy (if no coordinate is given on the right, further test possibilities are indicated)
- coordinates for detailed trouble-shooting.

If detailed information and instructions are required for trouble-shooting, always proceed in accordance with the trouble-shooting program starting on Coordinate M10.



Rapid Diagnosis Chart

Customer complaint (symptom of trouble)

1. Strong jerk when accelerating out of overrun

2. When declutching during the overrun phase the engine stops or drops below idling speed

3. Overrun cutoff also operates when engine is cold (temperatures $< +15^{\circ}\text{C}$)

			Cause of trouble	Remedy	Coordinate
●			Microswitch incorrectly adjusted	Adjust the microswitch so that it is closed with the throttle valve in the idle position and opens as soon as the throttle valve is opened <u>slightly</u> .	M 11, M 14
●			Throttle-valve bearing worn	Check throttle-valve stop and bearing for play. If necessary, adjust the stop or replace the bearing.	
	●		Overrun cutoff valve not closing, leaking	Replace the overrun cutoff valve	M 11, M 12
	●		Speed relay defective	Cut-in and cut-off engine-speed thresholds of relay incorrect. Speed relay defective or incorrect - replace.	M 10, M 16
		●	Thermo-time switch not closing, defective	Replace the thermo-time switch	M 16

M3

Rapid diagnosis chart

Retrofitted overrun cutoff



M4

Rapid diagnosis chart

Retrofitted overrun cutoff



2. Test specifications

Overrun cutoff valve approx 40 ... 90 Ω

Thermo-time switch
(between terminal "W" and ground)

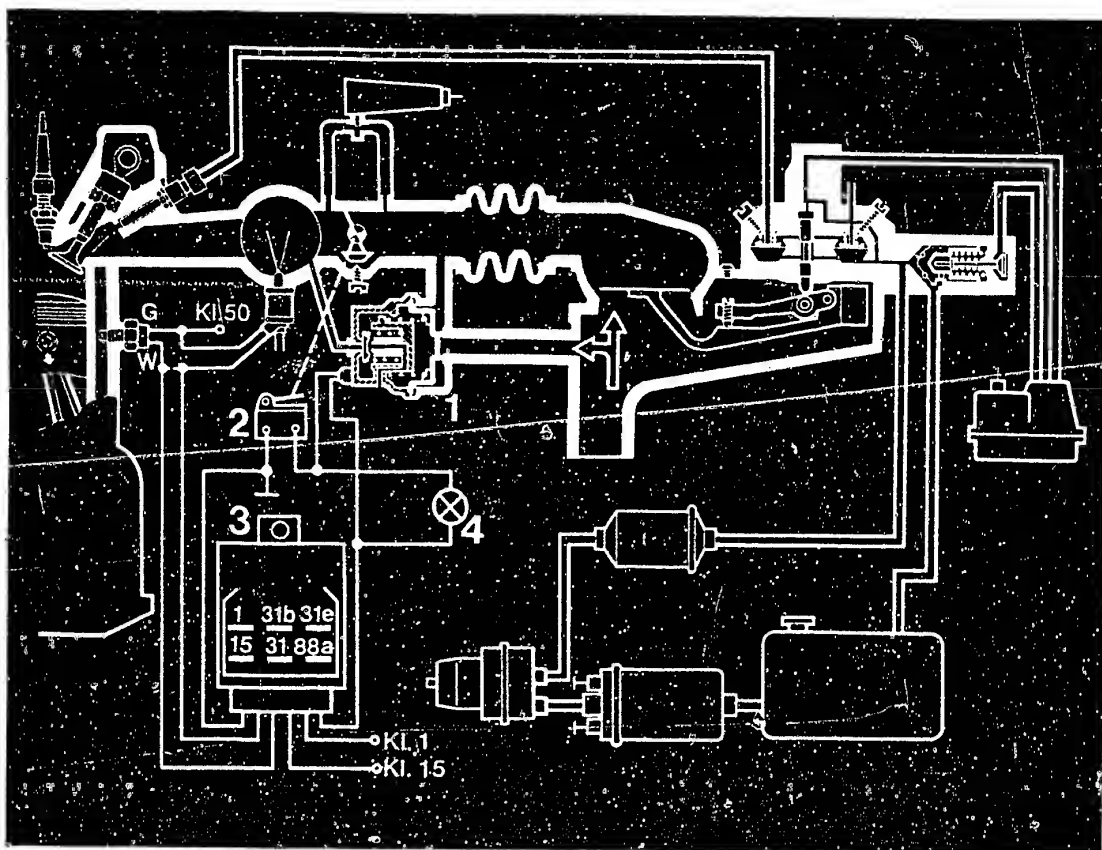
above approx + 50°C at least	100 Ω
below approx + 15°C	0 Ω



3. General information

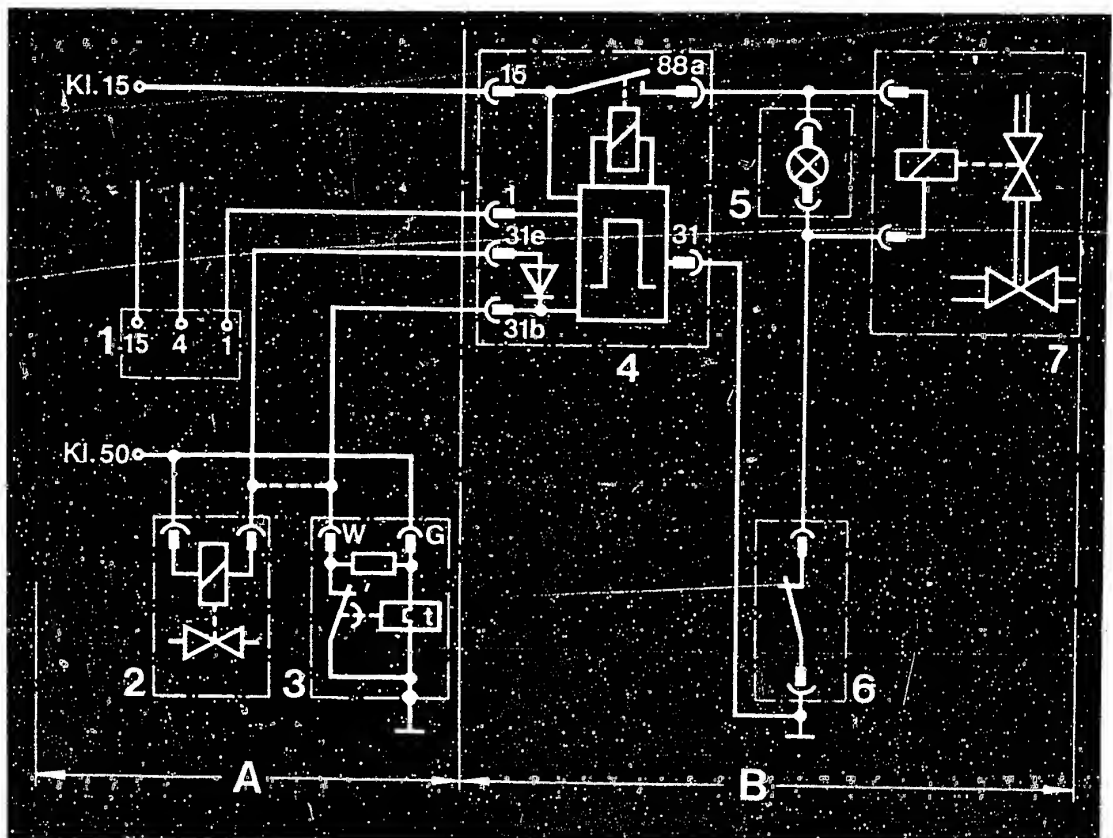
- . These testing and trouble-shooting instructions apply to all the vehicles with retrofitted Bosch overrun cutoff. Slight differences in the electrical circuitry should, where applicable, be taken from the corresponding vehicle-related installation instructions.
- . In order to be able to perform the test operations described in the following and to assess the components, you should be familiar with the overrun cutoff and how it works.
The essential points concerning its construction and operation are described in Technical Bulletin - New Product - "Overrun Cutoff" VDT-I-438/4 En.
- . When testing and trouble-shooting the overrun cutoff, it is assumed that the K-Jetronic system is in proper working order.





4. Diagram of lines and position of components with information on operation

- | | |
|--------------------------|---|
| 1 = Overrun cutoff valve | (in air bypass around air-flow sensor plate) |
| 2 = Microswitch | (on throttle-valve assembly for detecting idle) |
| 3 = Speed relay | (with cut-in and cut-off engine-speed thresholds, as well as for suppressing the overrun cutoff during the warm-up phase) |
| 4 = Indicator lamp | (lights up when overrun cutoff is activated) |



5. Electrical Circuit Diagram

A = Components of ignition/injection system

1 = Ignition coil

2 = Start valve

3 = Thermo-time switch

B = Components of Overrun Cutoff

4 = Speed relay

5 = Indicator lamp

6 = Microswitch

7 = Overrun cutoff valve

6. Testers and Tools

Multimeter, $R_i \geq 20 \text{ K } \Omega/\text{V}$ commercially available

Hand vacuum pump commercially available
e.g. "Mityvac"



7. Testing and Trouble-shooting

7.1 Electrical Tests

Test all leads for continuity and correct connection.

. Speed relay

Test connections in plug-in base, with relay removed from plug-in base.

Inputs:

- Pin 15 = Battery voltage (Positive) from terminal 15 (ignition)
- Pin 1 = Engine-speed pulses from terminal 1 (ignition coil)
- Pin 31 = Ground from throttle-valve assembly
- Pin 31b = Ground from terminal W of thermo-time switch, only at engine temperatures $>15^{\circ}\text{C}$.

Outputs:

- Pin 31e = Connection to a terminal of the start valve
- Pin 88a = Connection to a terminal of the overrun cutoff valve, as well as to the indicator lamp.

The ground connection to the start valve from terminal W of the thermo-time switch which is normally dependent on temperature is looped through the speed relay via pins 31b and 31e. Therefore, when retrofitting the overrun cutoff on vehicles with K-Jetronic, the connecting lead from terminal W of the thermo-time switch to the start valve must be cut.



. Microswitch

Testing the connections

Input: Ground from throttle-valve assembly

Output: With throttle-valve in idle position, ground to overrun cutoff valve, as well as to indicator lamp.

. Overrun cutoff valve

Testing the connections in plug, remove plug from valve

Inputs: One connection to pin 88a of speed relay, one connection to microswitch.

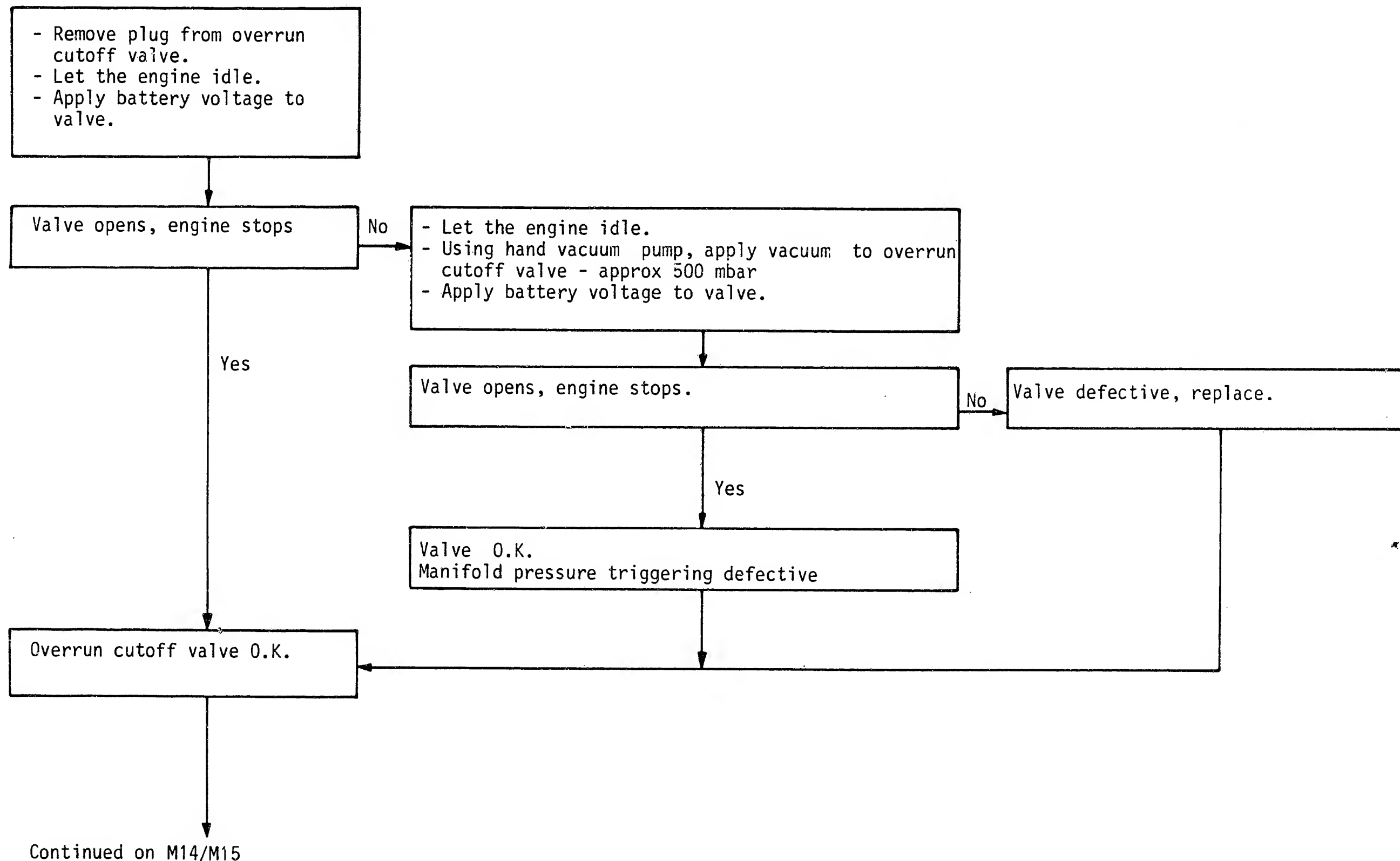
Resistance test on valve: Test specification
approx 40 ... 90 Ω

. Indicator lamp

Both terminals are connected in parallel with the overrun cutoff valve.



7.2 Functional Test



M12

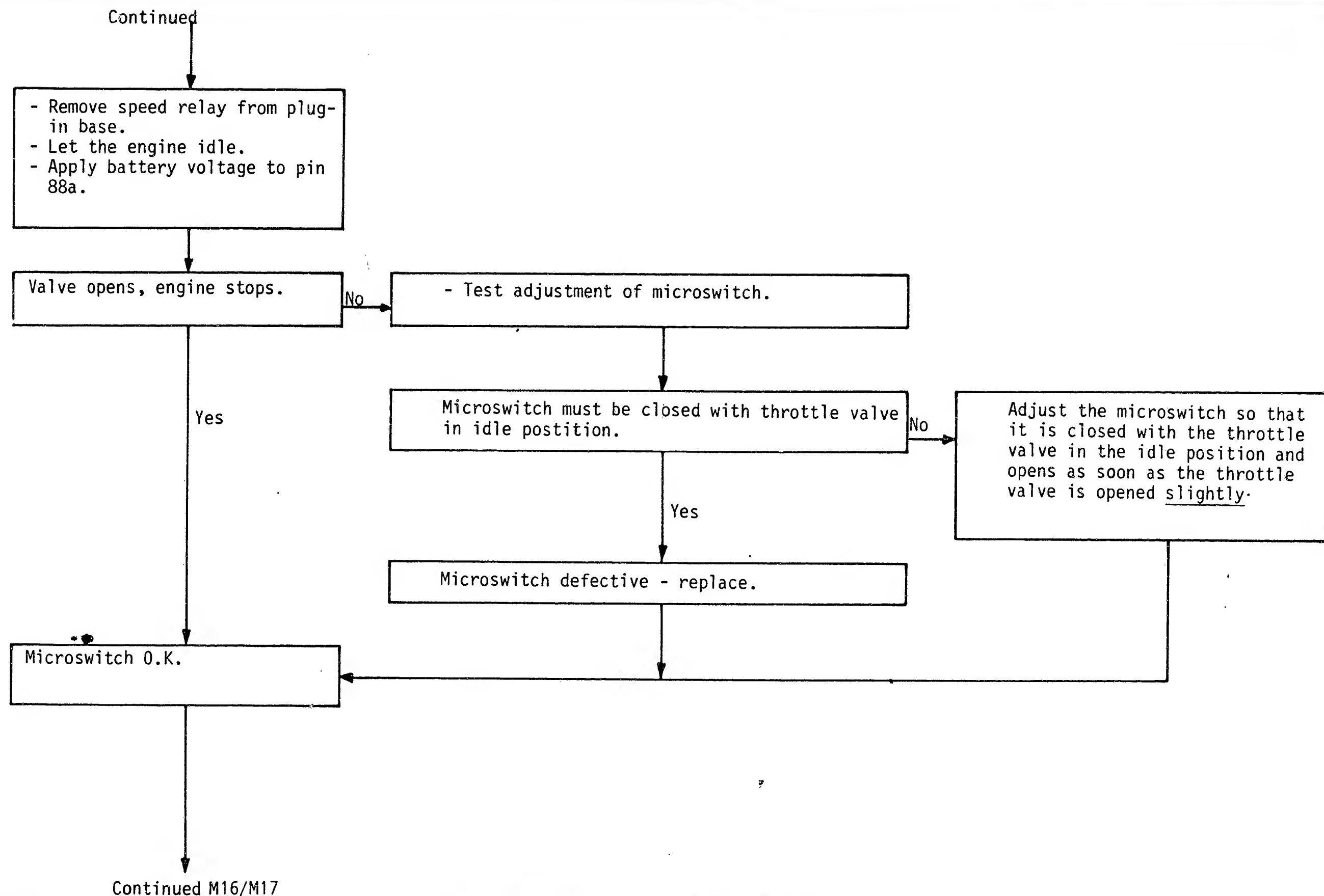
Testing and Trouble-shooting
Retrofitted overrun cutoff



M13

Testing and Trouble-shooting
Retrofitted overrun cutoff





Continued

- Plug speed relay into plug-in base.
- Bring the warmed-up engine to approx 3000 min^{-1} .
- Press the microswitch.

Valve opens, engine stops.

No

- Test the thermo-time switch.

Yes

Terminal W must be floating above approx 50°C
(switch open, min. 100Ω).

No

Thermo-time switch defective,
replace.

Yes

Speed relay defective, replace.

Speed relay operating.

M16

Testing and Trouble-shooting
Retrofitted overrun cutoff



M17

Testing and Trouble-shooting
Retrofitted overrun cutoff

